MOTORAGE

Volume XXXV Number 21

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Essex Sales Made Easily

New Car's Quality Speaks

Dealers' Profits Growing

It is doubtful whether any new car has ever enjoyed the instant popularity of the Essex.

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Quality in performance and beauty in appearance, coupled with confidence in the ability and prestige of its builders, have made the Essex the easiest selling car motordom now knows.

Dealers of foresight early grasped the opportunity to prosper along with the Essex. They have made good. Their stores are the center of motor sales activity.

Waiting lists had to be established from the start. Production increases daily and because there are cars for dealers to deliver to their customers there is great prosperity for all who sell the Essex.

There are still a few places for Essex dealers.

Men who are aggressive—sound business men of the high standard that will match the

standard of dealers elsewhere—should write now. If you are chosen as an Essex dealer it means profits.



(H)



UTILITY Automotive Products

UTILITY PEDALS

Fords



\$1.25

Per Set

May



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UTILITY DISAP-PEARING TRUCK BODY. For Fords, Price \$38.50

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JOBBERS: Get in touch with us.

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Archer Avenue and Canal Street CHICAGO

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UTILITY RIM WRENCH For All Cars \$1.3

UTILITY Protected Heater For All Cars \$9.00 to \$25.00

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CONTENTS

Copyright 1919 by THE CLASS JOURNAL COMPANY

The Road to Success	. 7
Highway Improvement in Prospect	11
Editorial	12
Transatlantic Flight	13
Fight Truck Chassis Tax	14
Ford-G. M. C. Rumor	16
Uniontown Race Report	18
Tractor Rating Proposed	20
Tea Wagon for Repairshop	21
Automotive Trade in Iowa	22
Diagnosing Engine Trouble	
Development	
Brown Engine and Cole Sport-	
sedan Described and Illustrated.	
Heat Treatment of Steel	32

DEPARTMENTS

Garage Planning	. 28
Wiring Diagram Chart	. 34
Readers' Clearing House	. 35
Electrical Equipment	. 42
Motor Car Repairshop	
Electrical Equipment Tables	. 46
Maintenance Data Sheet	. 50
Service Equipment	
Among the Makers and Dealers	
From the Four Winds	. 54

Advertisers' Index-Next to Last Page

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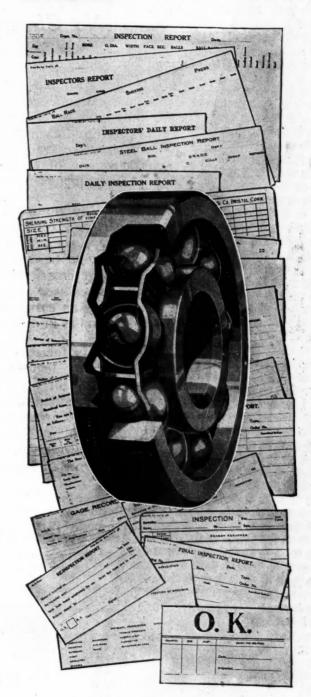
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HOWING a few of the factory report forms used in the testing, checking, gauging and inspection systems by which New Departure quality is persistently maintained



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The Road to Success.

An Article for the Potential Tractor Dealer and Repairman

By WARD R. McGAVREN

- The McGavrens Sell Service and Tractors Profitably Because They:

 1—Picked a standard machine that is not a freak and which is built by a standard company, that will stand absolutely behind you and that will be here next year to help you fight your battles.

 2—See that that machine can be repaired easily in the field.

 3—Sell these machines to customers who really need tractors and who will try to take care of them.

 4—See that the machines are right before turning them loose.

 5—Give the customer plenty of the right kind of instruction at the start.

 A S a firm we consist of my brother and myself, he twenty-three

 The McGavrens Sell Service and Tractors Profitably Because They:

 6—Through free service schools, over the 'phone, by conversation at the office give him all the advice he asks for, and always tell him WHY.

 7—Use judgment with each customer and charge him for service at his machine as soon as possible after the second trip.

 8—Keep the repairs in stock absolutely for magneto and machine and know how to find the trouble with that machine and have the equipment necessary to get the tractor back at work as soon as possible.

S a firm we consist of my brother and myself, he twenty-three A and myself twenty-eight years old, and neither of us very long experienced as business men. We started into business for ourselves two years ago and my brother had no experience at all up to that time, while mine consisted of five years' road work and office work for the Avery Co. We have kept our business from the start a strictly tractor business, only selling such other machinery as can be handled by the power of a tractor on the belt or at field work. Our capital was mighty limited, you might say we started with nothing, and we have had to go on the credit extended to us from our home bank, so you can see that it has

been up to us to go slowly and surely, and whenever we have made a mistake in the handling of our business we have had no extra capital to cover up the defect and it has always come to the surface in a hurry.

However, we believed in the tractor from the very start and have spent our entire time studying and working with them and we believe that our enthusiasm and pep along this line have been the biggest help to us in the small success we have made in our business. We believed in tractors when most of our farmer friends thought we were crazy and when all the dealers in this part of the state laughed at the proposition of them ever being practical. As

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salesmen for a company we put quite a few plow tractors in here before people generally woke up to the wonderful success they were going to prove. That gave us a real start in the tractor game and has helped us wonderfully in getting our share of the business the last two years.

Tractor Service Hard Problem

One of the hardest things we have had to contend with, and what is prossibly the biggest evil, is the tractor service proposition.

the busy season comes on we try to order heavier in proportion to the need. This gives our customers better service, and it also saves us extra interest on money invested in the off seasons. By handling one line of a good many different sizes and with these sizes having many parts on them interchangeable, we are able to sell the size anyone wants and still are able to give good service with the minimum invested. Aside from the service standpoint, it is a good investment for us, for the company allows us an added commission, as it does any dealer who carries the goods in stock, and

"We Have Found Three Essentials for Real Service"

FIRST—The farmer must be sold a tractor which can be easily taken care of in the field. A tractor cannot be taken to town as an automobile and repaired in a machine shop—it must be fixed where it stands without much delay or expensive trouble.

SECOND—In order to do the work in the field quickly the tractor must be easily adjustable in all parts and all parts on which machine work is to be done should be detachable so that they can be replaced easily by other machined parts without having to take an entire machine shop to the field to take care of the trouble.

THIRD—The parts must be kept in stock absolutely at the dealer's place, for delay in shipping, mistakes in ordering repairs and the result of a stalled tractor do more harm than can be counterbalanced by all other service a man can give.

However, I believe we have the situation in hand now and that we are not going to give away our profits in service and yet we are going to satisfy our customers. THE HARDEST THING WE HAVE HAD TO LEARN IS THAT THERE IS NO SUCH THING AS FREE SERVICE. If the manufacturer furnished the service he would have to increase his service department a hundred times and the price of tractors would go beyond the place where they could be sold. If we furnish the service absolutely free we should soon be bankrupt, for the profits in the tractor business are too small to allow of many free trips to fix the customer's tractor. And if the tractor dealer goes out of business the farmer is back again on the factory's hands is paying for his service, so free service is wrong—'there ain't no such animal''—for someone has to pay the bill and the farmer pays it in the long run.

Essentials of Real Service

And in giving real tractor service to the farmer we have found these things will hold true:

First—The farmer must be sold a tractor which can be easily taken care of in the field. A tractor cannot be taken to town as an automobile and repaired in a machine shop—it must be fixed where it stands without much delay or expensive trouble.

Second—In order to do the work in the field quickly the tractor must be easily adjustable in all parts and all parts on which machine work is to be done should be detachable so that they can be replaced easily by other machined parts without having to take an entire machine shop to the field to take care of the trouble.

Third—The parts must be kept in stock absolutely at the dealer's place, for delay in shipping, mistakes in ordering repairs and the result of a stalled tractor do more harm than can be counterbalanced by all other service a man can give.

Sell Standard Make

Now, in the first place, we make a point of handling a standard line of tractors which absolutely can be repaired in the field. As to the engine, we can regrind or reseat valves, put in new valve guides and take up bearings easily in the field. And when the average tractor will need a set of cylinders rebored, which means a long trip to the shop, we can slip in a new set of sleeves and pistons and rings, which we keep in stock and which are made up special for us—I mean they are fitted to each other—by the factory, and in a short time and with very little trouble we have a new engine again. Also we can repair radiators, change gears and do all adjusting right in the field without the aid of a special machine shop equipment. Thus we take care of the second point.

Carry Repair Stock

In the third place we carry in stock all the parts we have found are at all liable to wear out or break and we carry these in sufficient quantities, so we are pretty sure to have them when needed. As we pick up a very nice business around our territory from other dealers' customers who have learned how quickly they can get the parts here. In addition, it allows us to put in more and more a bigger line of accessories on which the commission is always good and which ought to help our overhead a lot.

Pick Your Customer

Now, with the right kind of a line on which to give service we go at it about like this:

First—We have found out to the injury of our pocketbook that some farmers, like some other folks, cannot run a wheelbarrow withut trouble and never do get so that they can make a tractor pay. They always require a lot of service and usually growl more than the other fellow, and always poison your chances of selling any of their neighbors. So, if we know for sure the ability of a man in this line and that he is pretty liable to make a dismal failure of tractor farming, we keep away from him. It is mighty tempting when a competitor is hot after the same deal to go after it ourselves, but every time we have gone after it and landed the deal we have felt sorry for it later. Also we have found that we must not sell a tractor for a farm not suited for it, for the service here always eats up the profits and hurts future sales.

Second—After selling our man we give him an instruction book and try to impress him that he must read it thoroughly, which he does or does not do according to the kind of student and mechanic he is.

Service Begins at Home

Third—We have found that the place to save on service is right at home and now before a tractor ever goes out to a customer we see to it that it is adjusted and the plow set right as nearly as possible. We see that it has oil, that it runs the right speed, that the governor works, that the gears mesh properly—in fact it must be right before it goes out of town. Some little adjustment neglected in town may easily lead to a trouble which a little later may cause several expensive trips to the machine, and it always tends to make the customer mad at the delay. We could have saved many a dollar this way if we had followed this procedure from the start.

Rainy Day Schools

Fourth—Each year we give a service school in the spring and they are beginning to be popular and usually bring in some prospective buyers as well as old customers. However, they do not catch the new customers very well, so this year we are trying to make it a practice of holding a small service school each rainy day or odd time that a few customers are in our office. As they drift in one by one to loaf we try to get some one of them to telling the little troubles he has had, and it soon leads into a question class which brings out the difficulties and they all benefit by it. This

is a new thing with us and has not been tried out long but I'm sure it's going to prove successful. Drifting in this way and getting interested in the subject usually puts them in the mood to purchase something before they leave and should pay us for our trouble.

Fifth—This year, we entered heartily into a state service school with other dealers in the county and were able to get a good deal of information to our own customers as well as a good many of their neighbors, and the fact that we kept away from the sales end of it entirely did not hurt us, I am sure, for it showed the farmers generally that we were interested in our customers' welfare, and that will make more sales in the long run.

Put the Customer to Work

Sixth—When we deliver a machine we try to have the customer on hand if he is a new one and we make him do all the operations of getting it ready to go and we see that he drives it home himself. By the time he gets there he is pretty near able to handle it on the road. Because we have adjusted it in town it is ready to work with little delay, which saves us a big expense, and our man, if the conditions are right, puts the engine to work and, after showing the customer how to lay out his land to the best advantage, and after starting the rig and seeing that it is doing the work, puts the customer on the engine and proceeds to let him do the work while the man looks on and corrects him whenever necessary, and tells him why, always—the clearer and more concise reasons we can give a customer the cheaper our service bill is.

Second Service Visit Pays

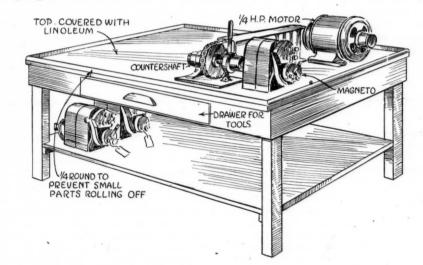
We have found no definite rule for telling how long we should stay with a customer, for some will take hold twice as quickly as others, and we always try to stay with a man until we feel sure that he can start and stop his machine, that he can handle it takes hold slowly and really needs some more attention to make him a good operator. However, by laying our plans as I have out lined we are able to get away from this grief a good deal and it costs us less than it used to. We aim to charge after the second trip for service, but in the case of a man who, we find, needs attention yet and honestly is trying to do right, we keep up with him as long as is necessary. Even if we do lose some on his sale we usually make it up on a sale to his neighbor. This is not quite fair to the customer who gets along without the service but it is the nearest to right we have found practical. In case of the type of customer who is always willing not to learn, as long as he can work us to give him free service, we easily put a stop to him as soon as we find it out-a good stiff charge for our services brings him around quicker than anything I know of. But we would like to admit right here that we would be much better off if we had realized this very thing a long while ago.

Charges for Service

As to the charges we make, we are trying to make them on a sliding scale form. The first season we are trying to give the customer service at cost, and in case of any defective workmanship or parts we supply the parts and labor free and fight it out with the company for our expense. After the first season we make a charge to the customer of the same price he would have to pay for a good handy mechanic at a garage, and we add on the mileage which we use up. On account of the fact that we have no machine work to do on our tractors we do not have to charge as high for our service as is charged for a real good mechanic at a garage. Also, because we work on nothing but tractors and one make at that we are able to do the work in much less time than outside mechanics, which allows us to compete very favorably with outside shops. As to the mileage we charge, we are this year figuring

Equipment Which McGavrens Have in Their Shop

The chest of tractor tools include special wrenches, punches, cold chisels, ham-mers, breast drill, files, hacksaw, sleeve pullers, taps and dies, grinding compound, etc. In addition, the shop has a set valve refacing tools. This equipment was not bought all at once, but a little at a time, as need for it was found. Naturally, this means a wellselected stock and the insurance of having the right tool at the right time



To the left is shown the magneto testing and repairing bench which the McGavrens have found very useful. With the particular make of magneto on their tractor, they have found that aside from a few special gear pullers, a screwdriver, pliers, breaker points wrenches and file are the only tools necessary for magneto work. Ordinarily the magneto is connected to plugs when being tested

without tearing it to pieces and that he will watch the oil and water supply. Then we leave him, but quite often we are compelled to return to him within a week to do the thing all over again. When he was learning to operate it his mind was so full of trying to keep the machine where it belonged that he failed to grasp all that was told him, but the second time you come back he is getting to where he can be told and remember what he is told and he is familiar with the parts you are talking about. It is this second trip where one can save more service expense. Nearly always some parts need re-adjusting, and if it is caught at this time the engine probably will work for a long time without further trouble. So we find that a second trip to all of them in the first few days is a good thing.

End of Free Service

Seventh—Now comes the question of the end of free service, and it is a question, to be sure. We have found it impossible to make a rule here either, for where one man learns quickly another man

it out on the actual expense per mile we were up against last year and so far have not definitely set the price.

Equipment for Service

Now as to our equipment. When I give you this you will make up your mind at once we are not giving much service. However, due to the type of tractor we handle, all we have found necessary is a good set of tools. We carry these in a large chest, and they include all the special wrenches for our make of tractor, special punches, cold chisels, hammers, a breast drill and all sizes of drills, special files, hacksaws, sleeve pullers, special taps and cutters, grinding compound, and all the other small tools one finds necessary in work of this kind. We have got together these chests a little at a time as we found the need of the tools, and they fit our work well. In addition to this, at our shop we have a set of valve seat refacers so that in case of a burned-out seat we quickly can put it in shape, or in cases where we renew the valve stem guide we can fit the seat to them.

Here also we have a magneto testing stand we have made up for our own use. It consists of an oblong table 2 ft. by 3 ft. 6 in., which sets up off the floor far enough so that one can stand up and work nicely at it. It contains a drawer for all the special magneto tools. In this connection let us say that with our make of magneto we find that, aside from some special gear pullers we have made up ourselves, a screwdriver, pliers and breaker point wrenches and file are all that are necessary. This table contains a shelf below on which the magnetos which come in for repairs are stored. The top of the table is covered with a smooth piece of linoleum and a strip of quarter round lays all around the top so that any small screws will stay on top and not roll onto the floor. At the rear of the table we have mounted a 1/4-h. p. electric motor belted to a countershaft. This countershaft contains a coupling to which we quickly can attach a magneto and run it at the speed it operates when on the tractor, or at any speed. Mounted with this we have a set of plugs which fire under compression or an air pressure equal to that in the engine, and they are so mounted we can tell whether they are firing or not through glass windows. With this tester we easily can locate a difficulty and save the customer much time and money.

Give Service on Magnetos

In this connection will say that we have secured the service station for the magneto we use, and as it is used on many of our competitors' tractors we advertise this station a good deal and not only make a nice profit off of our competitors' customers, but we have a good means of showing the farmers we did not sell that they can get real service by dealing with us. We keep a full stock of repairs for these as well as new machines, and we have drawn business in from as far away as the Mississippi river and from northern Nebraska. We find the magnetos on tractors give fully 60 per cent of all the trouble that occurs and a magneto going bad may lay up a farmer for days and a little 5 cent repair may put him out of \$50 in work. So when we keep all the parts for their protection they will gladly pay us a good price for our labor and thank us for the opportunity of paying it. It is the best little investment we ever made and we intend to work it for all there is in it.

In conclusion, I would say that it can be all summed up in these few words:

Profiting by Mistakes

In our estimation this will put a dealer in position to make money from the tractor business, and while we are too young at the game and have done so little in a financial way to prove our statement, yet we know in our own case it is helping us wonderfully, and we have arrived at this method after a lot of mistakes which cost us a lot of hard-earned money and know it is the best move we have made so far. At any rate, we feel it is a better method than doing like so many of our competitors arehandling from two to four different lines and trying to sell what everyone thinks he wants and not being able to give service on any of them. Our long line of customers, which includes brothers, father and son, brothers-in-law and, in fact, many other cases of relatives buying one after the other, and nearly all of them well enough satisfied that they return and buy cornshellers, separators, etc., proves to us that at any rate it is well worth trying some more before it is thrown in the discard.

Our make of tractor cannot be sold to everyone by any means. and it may be necessary after a while to take on another type to please those who do not believe in this type of machine. However, if we do, it will not be until we are satisfied it is a satisfactory machine and built by a satisfactory company, and we will know we can give the buyer service. As I said before, we are believers in one line and taking on another line does not appeal to us at all, and if we ever do it will be of entirely different type to cover some class of work our line would not.

Jitney Service Cars

In regards to our service cars we have found that using jitneys has given us the best satisfaction. For our service work we use a light Ford roadster we fixed up. It will hold a man and tools and is very light and cheap to run over rough roads. As to Fords, they break down and cause trouble, but we can run them in mud, rain or snow and over ploughed fields without hurting our conscience, and we can get the repairs and put them on ourselves quickly.

DURING APRIL

Washington, May 16-During April, 1919 the secretary of agriculture approved project statements for 120 Federal aid projects, involving the improvement of 923.53 miles of road at a total estimated cost of \$16,261,326.51, and on which Federal aid in the amount of \$7,528,550.68 was requested. This represents the largest number of project statements approved, the largest total estimated cost, and the greatest amount of Federal aid requested during any month since the passage of the Federal Aid Road Act, March, 1919, had surpassed all records in these items up to that month.

During April fifty-five road projects were approved and executed involving the improvement of 521.51 miles of road at a total estimated cost of \$4,626,415.48, and on which \$2,039,614.99 Federal aid was requested and set aside in the treasury. In addition, agreements to cover seventy-two other projects were placed in process of execution during the month.

Up to and including April 30, 1919, project statements for a total of 1057 projects had been approved, after deducting all approved projects canceled or withdrawn by state highway departments. The 1057 projects involved 10,580.17 miles of road, a total estimated cost of \$92,933,-121.81, and a total of \$36,576,857.48 Fed-

NEW ROAD WORK RECORDS MADE eral aid. On the same date a total of 535 project agreements had been executed, involving 4,624.83 miles of road, a total estimated cost of \$39,059,327.44, and a total of \$15,614,929.61 Federal aid.

ROAD MEN RETURNING

Washington, May 16-The return of the Twenty-third Engineers regiment along with other battalions of road building forces has been ordered. This was requested in a resolution passed at a meeting of the American Road Builders' Association in New York City, February 28th, which authorized a committee to take up with the War Department the matter of returning these units. S. M. Williams, president Highway Industries Association, was made chairman of the committee and has been working with the Secretary of Agriculture for the return of the road men in the regiments mentioned above.

As the services of these men are greatly needed on this side to carry on the large amount of road work that will be undertaken in this country during the road building season, it is hoped that the remaining units will be ordered home as soon as they can be spared.

The large amount of money available for road building and the slowness with which it is being put under contract indicates the necessity for the prompt return of these men.

OHIO ASSOCIATION OPPOSES HORSE-**POWER TAX**

Columbus, Ohio, May 16-The annual convention of the Ohio Automobile Association was held in Columbus recently with about 500 representatives from various motor car clubs in the state in attendance. The meeting was one of the most interesting and enthusiastic in the history of the organization and was productive of much discussion on current matters.

The Ohio Automobile Association now includes 18,226 members, representing 41 clubs in the Buckeye State. Cleveland sent a delegation of approximately 100 members in addition to many others not included in the delegation. The sessions continued for two days, being featured by a banquet May 7 at the New Southern Hotel, where the sessions were held. Speakers at the banquet were Governor Cox, Lieut. Col. Ralph D. Cole, Secretary of State Smith, Mayor George J. Karb, and David Jamison, Newcastle, Pa., president of the A. A. A.

A resolution was adopted opposing the plan of taxing cars on the horsepower basis as containing the principle of double taxation. It was decided to use every means to fight the proposed law imposing a graduated tax on automobiles and trucks as long as they are listed for taxation in the ordinary fashion.

Highway Improvement Is Going Forward

High Cost of Construction Not Permitted to Prevent Much-Needed Road Work

WASHINGTON, May 17—Prospects for road construction continue bright, for all told twenty-six states have planned or approved bonds issues to a total of \$823,300,000 for highways. Of this amount \$177,800,000 has been authorized, in seven states, \$411,500,000 is being referred to the vote of the people; \$135,000,000 is being considered in four states and three states have voted against measures totaling \$85,000,000. The issues ratified include:

Illinois\$60 000,000	
Pennsylvania 50.000,000	
Michigan 50,000,000	
Oregon 10,000,000	
Utah 4,000,000	
Wyoming 2,000,000	
Nevada 1,000,000	

Bond issues will be considered shortly by the following four, for the amounts noted:

Georgia	,					\$60.000,000
Virginia						50,000.000
Alabama						25,000,000
Florida .						10,000,000

The people of thirteen states will vote on the following highway bond issues:

Minnesota\$75,000.000
Texas 75,000,000
Missouri 60,000,000
Oklahoma 50.000,000
West Virginia 40,000,000
California 40,000,000
Washington 30.000,000
New York 20,000,000
Maine 10,000,000
Colorado 5,000.000
Oregon 2,500,000
Idaho 2,000,000
New Mexico 2 000 000

The Forest Service plans to construct 1643 miles of roads this year, at an expenditure of \$12,000,000.

In addition a committee of state highway officials has been appointed to cooperate with the Federal bureau of public roads to carry out the provisions of the Federal Aid road act. The members were named by A. R. Hirst, president of the American Association of State Highway Officials and are as follows: George P. Coleman, state highway commissioner of Virginia; S. E. Bradt, state superintendent of highways of Illinois; Charles J. Bennett, state highway commissioner of Connecticut; W. S. Keller, state highway engineer of Alabama, and Ira R. Browning, state road engineer of Utah.

The secretary of agriculture May 1 had approved 1057 project statements for Federal Aid roads, involving the improvement of 10,580 miles at an estimated cost of \$92,933.000

TRUCK ROUTES FOR HOOSIERS

Indianapolis, Ind., May 19—The Hoosier State Automobile Association has established a motor truck division with W. C. Kreis, of the Kreis Transfer Co., who is president of the Indiana Transfer Association, as chairman, and Tom Snider, secretary of the same body and also secretary of the wholesale trade division of the chamber of commerce as secretary. The new division will work in conjunction with the highways transport committee and will aid in the establishment of rural motor express routes. It will gather information on rural motor express routes, roads, routings and all matters of general interest in this line.

Transport Men Meet

NEW YORK, May 16—Upward of seventy-five attended the first annual meeting of the National Highway Traffic Association, an organization formed last November for the purpose of working for traffic betterment throughout the country. This organization had its inception several years ago as a local traffic organization for greater New York. It soon was expanded into a traffic organization for the state of New York. The demands for solution of traffic problems from adjoining states suggested the desirability of making it a national organization which was successfully earried out. The membership is now over 300.

The subjects considered at yesterday's meeting had to do with the development of rural motor express. F. W. Fenn of the National Automobile Chamber of Commerce, gave a complete summary of what has been accomplished throughout the country. J. H. Collins, Highway Transport Committee, Washington, outlined the necessary plans for making surveys for rural motor express routes, and James E. Boyle, professor of rural economy, Cornell University, analyzed the situation in New York state. He showed the fluctuating costs of farm products in different seasons due to lack of flexibility in highway transportation. H. G. Shirley, secretary of the Federal Highway Council, Washington, referring to the work of the council, reported that it has 400 members and its work has been endorsed by 800 commercial organizations. The national character of the Federal Highway Council's activity is indicated by the fact that forty-three state highway departments are now co-operating with the council and sixty-eight different highway officials are represented in the

George H. Pride, president of the Heavy Haulage Co., New York, an organization engaged exclusively in motor transportation between cities and in practically any field, declared that heavier loads must be permitted on the highways if cheaper transportation is to be obtained. He says it is possible to make money on inter-city haulage between New York and Boston if you are permitted to carry 7½-ton loads, but not possible with 3- or 5-ton loads. His views on the problem of road cost are very practical. If you build expensive highways that will withstand heavy traffic, you lower

the cost of transportation; and if you build cheaper highways, that will not carry heavy traffic, you increase the cost of transportation. It is a case of six of one and half a dozen of the other. If you do not pay the bill in road-building, you pay it in higher cost of transportation and vice versa. In either case it is the general public that pays the bill.

DETROIT MOTORISTS MARK ROADS

Detroit, May 16—The Detroit Automobile Club is going to spend \$10,000 in 1919 in properly marking the highways of Michigan. The work will be carried on all summer. New signs at railroad, trolley crossings and dangerous curves were placed along the Dixie highway last week. A crew will start working on the Detroit-Michigan-Chicago highway this week and will sign the road all the way to South Chicago and to Sault Ste. Marie.

After the Dixie highway has been marked, attention will be turned to the Wolverine Pavedway.

CHICAGO HUDSON CHANGES HANDS

Chicago, May 20—The Hudson Motor Co. of Illinois has been formed to distribute the Hudson and Essex in this territory. The interests back of the Twin City Motor Co., Minneapolis, Minn., Hudson and Essex distributer in the Northwest, are concerned in the new organization, and J. R. Histed, formerly general manager of the Northwestern distributer, will be in active charge here.

Louis Geyler, who has been the Chicago distributer, will continue to handle the Dort and expects to take on another make in addition. The Hudson and Essex will be taken over by the new company June 1.

DETROIT SAFETY CAMPAIGN

Detroit, May 16—The Detroit Automobile Club, in pushing its safety-first campaign, has appointed a committee of 300 members, whose duties are to report all violations of the traffic laws. The club then sends to the parties complained of a letter of warning. It is the idea of the club to follow up on second complaint, and in event of a third complaint a formal charge will be preferred through the police department.

HOWARD LEAVES CADILLAC

Detroit, May 20—Special telegram—B. C. Howard, sales manager of Cadillac, has resigned, effective June 16. He said to-day he was going to stay in the automotive business but hoped to work for himself. It is rumored he will be associated with D. McCall White in a new motor car venture.

PLENTY OF GAS IN FRANCE

Paris, May 17—Special cable—The French gasoline supply now is considered satisfactory, and it is expected that all motoring restrictions will be removed this month.



EDITORIAL



Bad Roads as a Good Roads Demonstration

PAD roads as a good roads demonstration! That may seem nonsensical, but it isn't just what it seems. The best good roads demonstration we ever had were those of the Army truck trains, when snow, mud and water intervened between the seaboard and the inland points of origin for the trucks. The best good roads demonstration Iowa ever had was this year when the heavy rains made of Iowa's roads veritable mudholes, and some of the automotive industry's establishments had to shut up shop until the skies got clear, as has been told in MOTOR AGE before. The best good roads demonstrations anybody can ever have are being staged right now, in May, when the touring season should be on in full swing, what with the open winter and early spring. Demonstration of the need for good roads is being staged right along in many sections.

THE whole country has had more than the usual amount of rain. Nor are the rains over. Even in California, where rain comes only once a year, the rains have stayed longer. As for the states in the Mississippi Valley and the Mid-west and the South—rain is their middle name. What continued rains can't do to dirt roads isn't worth talking about. This spring it has been impossible to keep the dirt roads in shape even where the custom is to drag the roads immediately after a rain. The farmer can't get out and drag them on the comparatively few bright days; planting is behind and he has to be in the fields. Neither can he, without trouble and delay, make the necessary trips to town for repairs, for supplies, when the roads are so very bad. It is time the dealer and the farmer got together on this proposition and helped put a little more ginger in road-building.

Good Roads and Motor Trucks

DENVER led off with a motor transport day. Macon, Ga., had a motor transport run. Detroit this week scheduled its motor transport day. St. Louis is planning a truck run of several days' duration. The movement is spreading. Ship-by-truck, mofor transport, whatever you want to call it, is decidedly a topic of the day. Hand in hand with it should be brought home to the public the idea that this calls for ROADS THAT WILL BEAR THE TRAFFIC.

To tax a motor vehicle according to weight is not solving the problem brought about by the wear on roads caused by that motor vehicle. Even though the additional tax, for additional weight, may be levied with the principle in view that the motor vehicle should pay for the possible repairs made necessary by its passage, the case cannot rest there. True, this may be curative, but when prevention is possible, why wait until a person gets sick

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to cure him? We do not leave poisons around promiseuously even though we may know their antidotes.

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GRANT, for the moment, that motor vehicles beyond a certain weight injure certain roads. Is it not true also that bad roads, roads with ruts from former rains, injure motor vehicles also? The two—motor transportation and roads—are linked inseparably. The one reacts on the other. The better the roads, the more motor vehicles will be used. The use of motor vehicles, in turn, makes imperative the construction of good roads. Motor trucks—good roads. If you are a wideawake dealer you will keep up with the good roads movements in your state or locality and help with all the facilities at your command. It would be well for you to turn to the article on road bond issues in this issue and see whether your state is among those listed, then act accordingly.

Tea Wagons for Repair Shops

THERE are a lot of us who don't care much for afternoon teas, but they've got some of our repair shops beat forty ways to Sunday. Talk about service! Everything put together, loaded on a easy-rolling contraption and the whole gliding in to the proper spot at the proper moment. If you haven't read the article on applying the tea-wagon idea to repair shops, we hope the hants won't give you any rest until you do, in fact, until you put that idea into practice in your own place, provided you haven't it already.

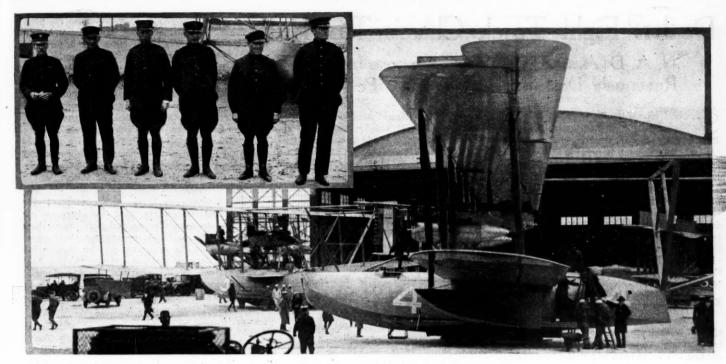
THERE are a good many ideas in other businesses that we might use. Even as this tea-wagon idea is good for the repair shop.

For instance, ideas in housekeeping. A poor maid is always sloppy-looking, but a good maid is always clean and neat. You, no doubt, have heard something about that way of keeping your mechanics dressed in clean overall suits, in clean clothing of some kind, anyway. Then there are some more. Every well-regulated household has a place for everything and tries to keep everything in that place. Likewise, every well-regulated garage or repair shop has a place for everything—and tries to keep everything in that place. This teawagon idea will help do several things—keep tools in place, keep the tools clean, the mechanics clean, as well as make for greater convenience and, therefore, greater speed and ease in workmanship.

Changed Conditions Still Hold

THE confusion and misunderstanding which is prevalent with the general public in regard to business conditions, particularly as regards to price movements, probably is largely due to the failure to see all of the factors which make and control these conditions. It is natural, for example, for a man to reason that the war having been the cause of the general increase in the level of prices—the war now being over—we will return immediately to the old level.

Such reasoning fails in the realization of the fact that the war created certain conditions which brought about the enormous changes we have had in the past 4 years; and that while the war is gone, changed trade conditions still hold. The national prosperity campaign, which is now being given publicity through many channels, sets forth clearly many of the reasons which underlie these changes conditions and shows why it is illogical to look for any early return of pre-war conditions in price levels, etc.



The NC-4 and its crew. Lieut. Com. A. C. Read stands at the left. Mishaps having removed the other American contenders, on the NC-4 rests the burden of winning the transatlantic for America

Transatlantic Race Between Two Planes

NC-4 and Sopwith Left in Running— Hawker Reported Lost—Read at Azores

HICAGO, May 20—As Motor Age goes to press victory in the attempt to cross the Atlantic by air is undecided. Yesterday morning Harry Hawker, the Australian, was reported unofficially as sighted off the coast of Ireland, but to-day all trace of him is lost and reports have it he fell near his goal. The NC-4 is slated to resume its flight to-day from the Azores for Lisbon. Com. John H. Towers and his crew have "taxied" in the NC-3, yesterday thought lost at sea, with what is probably a world record run of 205 miles on the sea itself, and that in a gale approaching a 90-mile rate at times.

Sunday afternoon the race to be first to cross the Atlantic by air had narrowed down to two. The NC-1 was out with severe

damages to plane and crew taken off by Columbia; the NC-3 missing some 40 hr.; and the Martinsyde out forever, owing to damages, before it even left the ground.

Whether Hawker has won his goal or not he has made for himself a deathless name for daring. For him there were only two alternatives—he must win or lose his life should his plane fail before the end of his straightaway flight from Newfoundland to Ireland.

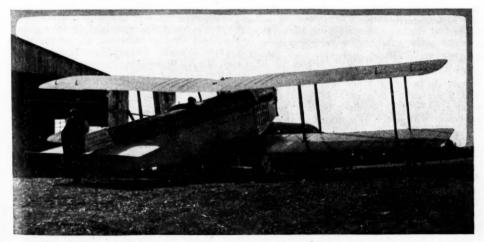
Throughout his flight also there was the possibility that even should he win he might not live to know his own fame, for the undercarriage of the plane was dropped at the start to reduce weight, and the Sopwith was without landing devices other than light skids. In addition Hawker

knew that if the Sopwith was forced into the sea neither he nor Commander Mackenzie Grieve, who made the flight with him, had much hope of rescue. Both men wore "water-tight" suits, designed to keep them floating many hours, but as their course was outside the lanes of shipping the chances of their being picked up in case of a fall were practically nil.

CAR DEALER SELLS PLANES

Chicago, May 19—Airplane distribution on a large scale through motor car dealers has commenced with the completion of arrangements by which the James Levy Motor Corp., Buick dealer in Chicago, becomes distributer for the entire Central West for the United Aircraft Engineering Corp. of New York. Levy has contracted for 150 of the Canadian JN-4 training planes and within the last two days has sold eight of them to a Denver dealer and several by retail in Chicago.

These planes are being sold at \$2,500, which is approximately a fourth to a third of their cost price, and are part of the equipment bought by the United Aircraft Engineering Corp. from the Canadian government, as told in MOTOR AGE some time ago. They have a 90-hp., eight-cylinder OX-5 V-type engine, have double control and weigh 1600 lb. They are capable of from 80 to 90 m.p.h. The possible market for planes of this type at a low price is indicated by the results of an investigation Levy made in Chicago, which showed 6000 trained pilots in this city alone. One of the planes will be on display this week at the Levy showsoom.



Hawker and his Sopwith, with which he attempted to cross the Atlantic

Dealers Fight Truck Chassis Tax Rule

N. A. D. A. and N. A. C. C. Oppose Internal Revenue's Decision Levying Five Per Cent

ST. LOUIS, Mo., May 17—A vigorous fight against the ruling of the Internal Revenue Bureau that a truck chassis is a "part" and as such is taxable at 5 per cent is being made by the National Automobile Dealers' Association, through Harry G. Moock, business manager. In addition to a protest to Commissioner Roper, the association has asked the secretaries of fifty-seven dealers' associations throughout the country not only to wire protests on behalf of the organizations but to have each individual member do so. The ruling is effective Feb. 25, although just announced. The N. A. D. A. telegram follows:

Error in Ruling

"Treasury decision, article 15, regulation 47, classifying truck chassis as a part is contrary to all sales usages. Truck chassis is a sales unit and is the basis of all truck sales regardless of the type or kind of body used. Therefore, classification as a part is not only an injustice but greatly impedes truck sales and is a penalty on business. Revision of decision, therefore, should be made so that truck chassis when sold complete as a unit takes 3 per cent tax, which we believe was intended when the 1918 revenue bill was framed."

Here are the reasons Mr. Moock gives for the revision of the ruling:

"Dealers have been selling on the presumption that a chassis is a truck and, therefore, taxable at 3 per cent. Thus the ruling will cost the dealers thousands of dollars. The 1918 decisions of the revenue bill classified the chassis as the unit of sale. For three months the dealers have been parting with truck chassis with only a 3 per cent tax against them, as passed on by the manufacturer. It is very probable that the manufacturers, because of their contracts, will be able to collect the additional 2 per cent from their dealers, but the dealers, having completed the transaction with their customers, will be unable to collect the 2 per cent additional thus passed on."

Mr. Moock also sent a telegram to George Graham, chairman of the motor truck division, National Automobile Chamber of Commerce, advising him of the protest and stating that the N. A. D. A. would send a delegation to Washington to make a protest if necessary.

The local dealers acted quickly on the suggestion of the Association. Telegrams being sent yesterday by nearly every man in St. Louis selling trucks.

A special war tax bulletin has been sent by the N. A. D. A. to its members, giving complete information on the decisions of the Treasury Department on the application of the new tax. One of the radical changes is the ruling that whenever a manufacturer overpays the tax to the Government in one month he may take a credit on his next monthly return instead of having to pay the full amount due for the month and applying for a refund for the amount erroneously paid the previous

month. As many dealers are "further manufacturers" this ruling is of importance.

WILL FIGHT CHASSIS TAX

Washington, May 17-The National Automobile Chamber of Commerce has filed a protest with the Treasury Department against the rulings on the tax for chassis. Under the present ruling if a manufacturer sells a chassis directly to a consumer a tax of 5 per cent is paid. If a manufacturer sells a chassis to a dealer no tax is paid by the manufacturer if the dealer knows for what purpose it will be used and the dealer fills out certain necessary papers. If, however, the dealer is unable to definitely specify how the chassis will be used, by whom, etc., the manufacturer pays a tax of 5 per cent. If the manufacturer sells the chassis to a distributer and he in turn sells to a dealer, both pay a tax. If a dealer sells a chassis, he pays no tax unless he at-

General Business Conditions

As Reported by Guaranty Trust Co. of New York.

There is a marked improvement in general trade and industrial conditions. The expectation is that this tendency will gain strength, now that the last of the war loans has been floated and the terms upon which peace with Germany will be concluded are known. A primary factor in the improving situation is the growing conviction that the general level of prices will be maintained for a considerable period. Not all observers and students of the problem agree that prices are on a permanently higher level, but it is believed that they will be maintained at present levels sufficiently long to permit important commitments to be made with safety. An encouraging feature of the business outlook is a good buying movement, both in wholesale and retail spheres. From all accounts the absorption of men discharged from military service is continuing satisfactorily.

taches a body to it, when it is regarded as a manufactured vehicle and again becomes subject to taxation, 3 per cent for a truck and 5 per cent for a car. It is expected some time will be required before the department will give a new ruling on this.

SALES HELPS ON TRUCKS

St. Louis, Mo., May 17—The National Automobile Dealers' Association is to help its members sell more trucks and trailers. This is to be done through a new division known as the Commercial Vehicle Division, of which H. N. Cartinour of the Cartinour-Bowman Co., Indianapolis, Ind., distributer of Federal trucks, has been made commis-

sioner. The division will handle all problems that arise solely in the truck-sales

"Many of the N. A. D. A. members sell both passenger and commercial cars," said Harry G. Moock, business manager of the Association in outlining the purpose of the new division. "In many instances, commercial cars were added after the passenger car lines had been handled successfully and dealers failed to realize that the two presented a different selling problem altogether. Dealers, therefore, became discouraged with their line of motor trucks and dissatisfied with the results of their investment.

"Dealers realize that the two selling problems are different and they are writing to the N. A. D. A. presenting their problems. As the endeavor of the association is to furnish dealers only with the best practical advice possible, it was deemed sufficiently important to create the new division and handle the suggestions from the standpoint of money making for the dealer."

ADVERTISING AID FOR DEALER

Toledo, Ohio, May 16—A merchandising and advertising service for motor car dealers intended to build up the dealer himself as the dominant factor in trade circles in his community is offered to the trade by the John O. Munn Co. The new company is headed by John O. Munn, for nine years assistant advertising manager for Willys-Overland. The merchandising and advertising service will provide the dealer with publicity, merchandising counsel, advertisements and sales advice.

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EL PASO'S FIRST SHOW

El Paso, Tex., May 17—This city held its first annual motor show May 8-10 and is more than pleased with the results. Plans already are being made for next year's exhibition. The El Paso Automotive Trades Association was the sponser. Mexican families of Juarez and the Juarez chamber of commerce were guests one night. Brig. Gen. James B. Erwin commanding general of this district was guest of honor on another occasion. An exhibit of portable repairshop trucks, kitchens and cars was furnished by the motor truck corps from Fort Bliss.

CHICAGO AGENCY FOR ELGIN

Chicago, May 19—The Elgin Motor Car Sales Co. has been organized to take over the Elgin for this territory, succeeding the factory branch. Frank Shaw is president and H. A. Wehmeier, formerly identified with the sale of the Paige, Buick and Maxwell, general manager.

DEALERS STAGE CAR TESTS

Chicago, May 19—That the value of unusual tests as advertisements is appreciated by dealers is shown in three recent events noted. In Los Angeles a Maxwell was driven 734 miles in 24 hr. in a non-stop high-gear run, and in Oklahoma an Overland was operated on a similar test for seven days and nights, covering 4370 miles. H. L. Arnold, Maxwell distributer, and the Carhart Motor Co., Overland dealer, put on these tests respectively.

Then we have another Overland-dealer test. Wednesday a model 90 rolled up to the Connell & McKone salesrooms in Boston at the end of twenty-one round trips between that place and the salesrooms of the Overland dealer at Springfield. The car covered 3852.6 miles, averaged 21.5 m.p.g. of gasoline and 228 m.p.q. of oil. This test also lasted seven days. No effort was made for speed.

FERRIER HEADS ACCESSORY TRADE

St. Louis, Mo., May 17—W. L. Ferrier was elected president of the St. Louis Motor Accessory Trade Association at the annual election Tuesday. The other officers are: Vice-president, E. J. Methudy; secretary, Robert E. Lee; treasurer, A. R. Baxter. A plea for members of the association to keep complete and accurate records of the accessories they sell, using the manufacturers' serial number, was made by Chief of Police Martin O'Brien. He said that thefts of motor cars had been detected by numbers on comparatively unimportant accessories, when serial numbers of engine, body and chassis had been obliterated.

DO YOU EMPLOY ALIENS?

New York, May 16—Have you any alien employees in your place of business? In other words, have you any persons working for you who are not citizens of the United States or who have not declared their intention of becoming citizens?

If you have and are paying them \$1,000 or more a year in wages or salary, you will be required to deduct 8 per cent of everything over \$1,000 you pay them and turn it over to the Internal Revenue Department.

But there is a way to avoid withholding any money from your employees. This can be done by having every alien fill out and sign Treasury Department Form No. 1078 (Rev.). This is a declaration of the citizenship of the alien. It tells what country he is a citizen of and explains in effect that inasmuch as he may have had to pay an income tax in the country of his citizenship he should not be expected to pay an income tax to the United States government as well.

It makes no difference whether the alien is an enemy alien or not. He may be a citizen of Great Britain, France, Belgium or any other country. If he is not a citizen of the United States you must either withhold 8 per cent of his pay in excess of \$1,000 in 1919, or have him fill out this form, which exempts you of all responsibility.

REPUBLIC DISTRIBUTERS TO MEET

Alma, Mich., May 17—Notices of the first regular meeting of the Republic Truck-Distributers' Association are being sent out by H. M. Genung, president of the organization. The meeting will be held in Chicago June 2-3.

TO DISTRIBUTE KING

Chicago, May 19—The Iron City Motors Co. has been appointed distributer of the King in portions of Illinois, Iowa, Michigan, Indiana and Wisconsin. For several months the concern has been Chicago representative for the Stewart truck.

Tour to Bring Motor Truck to Farmer

Exhibition on Wheels Is Planned by St. Louis Trade for Small Town and Country

ST. LOUIS, Mo., May 17—Most of the details of the St. Louis Motor Truck Exposition, which will bring a motor truck show to the farmers and residents of small towns in Missouri and Illinois, have been completed. The expedition is under the auspices of the Commercial Car Bureau of the St. Louis Automobile Manufacturers' and Dealers' Association. One hundred or more trucks are in the train, which will leave St. Louis June 2 at 6 a. m. for St. Charles, Louisiana and Hannibal, Mo.; Quincy, Rushville, Beardstown, Jacksonville and Alton, Ill., back to St. Louis. The distance is about 372 miles. To make as many stops as possible, the time for the trip was fixed at seven days.

Preston W. Duffy, truck man for Chevrolet, will be tourmaster. He was in motor transport work with General Pershing on the Mexican border. Speakers will accompany the train and deliver talks on transportation, good roads and other timely topics. Moving pictures will illustrate the work of trucks and spread good roads propaganda on the public squares of towns where the expedition rests at night. There will be no night driving.

The schedule of miles per hour will depend upon road conditions, not to exceed 10 m.p.h. Any size truck may be entered up to and including 2 tons. Cars will be barred, except official cars necessary to operate the train. Customers will be invited to take part for such benefit as they may derive from advertising their business.

Entries close May 26, and co-operation of dealers is asked to put St. Louis on the map as a truck distributing center and to visualize the needs of modern transportation

The idea of the expedition originated with Harry G. Moock, business manager of the N. A. D. A. He departs tomorrow night for Detroit, where he will outline to dealers a plan for a similar expedition. Kansas City dealers also are considering the idea.

AFTER "BARGAIN TIRE"

Milwaukee, Wis., May 19—One of the most constructive activities yet undertaken by the Milwaukee Tire Dealers' Association, in existence for about a year, is to begin a co-operative advertising campaign designed to offset the ill effects of the "bargain tire," which has been growing stronger in Milwaukee as well as in other cities of the country.

"Buy tires from certified dealers only" says a large display advertisement published in the Milwaukee daily newspapers under the caption, "Warning." Continuing, the advertisement says: "Milwaukee is being flooded with so-called bargain tires"—cut rate tires—worthless seconds and rebuilt tires. For your own protection, do not buy tires from anyone except a dealer with a proven reputation, from a man who sells a known tire and stands back of every sale he makes.

"The members of the Milwaukee Tire

Dealers' Association are all men of responsibility and they own long-established businesses. When you deal with a member of this association you are assured of getting these things:

"Well-known, standard, trade-marked

"Tires backed by a factory guarantee and the personal guarantee of the individual dealer.

"Tires that are really new-fresh from the factory.

"If you buy a 'second' or 'rebuilt' tire from a member of the association, it is sold to you as such—you get just what you pay for—full value for the money you spend.

"There is no such thing as a 'cheap' tire. When you buy so-called 'bargains' they never give the amount of service you would get from a standard make. Usually you pay many times what they are actually worth. Buy your tires from men who are willing to back their goods and their reputations as responsible business men with a guarantee."

The advertisement is signed by thirtytwo of the leading tire dealers in Milwaukee, who comprise the association.

NEW BRISCOE ABOUT READY

Detroit, May 16—The new car which Benjamin Briscoe and his assistant Rodolphe Stahl are designing for the Bellanger Freres Co., Paris, France, will be on the road in a few days. The first model stands practically complete. It is made entirely of American parts, most of which will be shipped to France if they cannot be manufactured at the plant of the French company.

WORK AGAINST MISLEADING ADS

New York, May 16—The work of the Associated Advertising Clubs of the World for the prevention of unfair competition through misleading advertising will be multiplied by the expenditure of a special fund of \$141,000 a year on a three-year basis, raised for the purpose. The work will include special investigators working at New York headquarters, additional local vigilance committees, a bureau to protect foreign markets and intensified work in cooperation with trade associations for establishing correct standards in various lines.

More than a tenth of the special fund already has been raised. Among the concerns who have contributed are Goodyear, Goodrich, Firestone, Miller, United States Tire, General Tire, Mohawk and Portage.

PERFECTION HEATER SOLD

Cleveland, Ohio, May 16—The Perfection Heater & Mfg. Co. has acquired the entire organization of the Perfection heater division of the Standard Parts Co. The new company, which is capitalized for \$300,000, has leased a building and increased production to 1000 heaters a day.

W. A. C. Smith is president and the other officers are: Vice-president and general manager, C. S. Pelton, for seven years with the Perfection spring and the Perfection heater divisions of the Standard Parts Co.; secretary and treasurer, F. D. Kellogg. E. L. Jones, for several years with the Remy Electric Co. and the Standard Parts Co., will be special factory representative. L. H. Peck, formerly machine tool designer for the Foote-Burt Co. and recently released from aviation service, has charge of engineering and production.

STARTERS FOR CANADIAN FORDS

Detroit, May 16—Canadian Ford touring cars and roadsters will be supplied with starting and lighting devices as optional equipment at an extra charge after June 1. All Canadian closed models now have the starters as part of standard equipment.

ANOTHER TIRE LOWER

Charlotte, N. C., May 17—The J. & D. Tire Co. has reduced the prices on its tires and tubes 10 per cent. This is effective May 12.

CLAUDEL IN U. S. PRODUCTION

New York, May 16—The Claudel carbureter, patented in France in 1902, will be produced in America by E. J. Conill and Israel Ludlow. Its affairs were handled by the Aeronautical Equipment Co. until Mr. Conill arrived to take personal charge. The Detroit branch will be directed by Frank R. Jackson, for many years with the Zenith Carbureter Co.

ROLLS-ROYCE TO BUILD HERE

New York, May 16—Rolls Royce, Ltd., London, Eng., is preparing to manufacture in America. No definite location has yet been named, but it is understood that the plant will be somewhere in the eastern part of the United States, where Rolls Royce will be manufactured complete.

TO MAKE NEW TRUCK

Kalamazoo, Mich., May 17—The Kalamazoo Motors Corp., which is incorporated for \$250,000, has taken over the business formerly conducted by the Lane Motor Truck Co. and will make a truck to be called the Kalamazoo, in three sizes, 1½-2½- and 3½-ton. The present models were designed by L. W. Coplock, chief engineer and production manager, and have been on the market three years. The officers are: President, H. A. Crawford; vice-president, C. J. Johnson; secretary, R. M. Gregory, and treasurer, W. B. Milham.

OVERLAND WORKERS TO RETURN

Toledo, Ohio, May 20—Special Telegram
—Two-thirds of the Willys-Overland employees will come back to work Monday on
the company's terms. Police protection
will be provided by the city. A third of
the employees are yet to be heard from.

GOODWIN LEAVES CADILLAC

Detroit, May 20—Special Telegram—E. W. Goodwin, body engineer of Cadillac, is resigning and will open an office here as special body designer.

Ford-G. M. C. Rumor

Gossip of Alliance Between Big Interests Refuses to Be Killed

Denials from Both Sides Are Emphatic

DETROIT, May 16—Griswold street, Detroit's financial center, always noisy with rumors pertaining to the automotive trade, is still insisting the Ford Motor Co. is about to be absorbed by General Motors. William C. Durant, head of General Motors, has emphatically denied that such a deal is pending and to make it stronger issued a denial over his own signature. Henry Ford and his son Edsel say nothing, but lesser Ford officials deny the rumor also.

In every brokerage office here which deals in GMC stock there is an air of expectancy. In spite of high prices the stock is in demand but sales are not heavy, inasmuch as holders of this stock are hanging on waiting for its expected flight. In the meantime the rumor of the Ford-GMC merger continues to be heard on the street but nothing of a definite nature has developed.

Pierre duPont, one of the group whose money is backing General Motors, has been in Detroit looking for a home, it is said. The street interprets this to mean that the Ford-GMC deal has gone through or is about to. Another report is that there is a difference of 100,000,000 between the negotiators, this being the consideration Mr. Ford asks in return for his permanent retirement from motor car manufacturing—a condition upon which Mr. Durant is said to insist

NASH DENIES COMBINE

Kenosha, Wis., May 17—In answer to the recent reports as to a possibility of a combine of the Nash Motors Co. with several other companies in the industry C. W. Nash, president, states that these reports are not founded on facts and that there is no possibility of the Nash Motors Co. becoming a subsidiary of any other company in the industry.

HAYNES PLANS EXPANSION

Kokomo, Ind., May 17—The Haynes Automobile Co. plans \$1,500,000 worth of construction for this year and expects to increase its capacity to 15,000 cars a year. It will put up a new factory building 500 by 150 ft. and four stories high, giving an additional 300,000 sq. ft. of floor space. The company is increasing its capital accordingly to take care of the expansion.

DEALERS FIGHT SUNDAY CLOSING

Little Rock, Ark., May 16—Forty Little Rock dealers in gasoline and accessories, and operators of service cars. who last week received orders to close their establishments on Sundays, met with the prosecuting attorney to give facts on the operation of service cars on Sundays.

Opinions of the trade men were given

freely. One dealer suggested that each dealer discuss the matter with partons, to which Mr. Emerson agreed. The next meeting is scheduled for next Friday night.

"In the meantime," said the prosecuting attorney, "let your conscience be your guide as to whether you keep open Sunday or not." The dealers said that their conscience would direct them to keep open Sunday.

The law provides that "Every person who shall, on Sunday, keep open any store or retail any dry goods, wares and merchandise establishment shall on conviction thereof be fined in any sum not less than \$25 or more than \$100.

STUDEBAKER DOUBLES PLANS

South Bend, Ind., May 17—Changes in the plans of the Studebaker corporation call for doubling the amount originally voted by the directors for the expansion of the plant. Originally Studebaker planned for buildings and equipment amounting to about \$4.250,000 during the present year, but all these plans have been revised because of changed and improved conditions generally. The new plant expenditures this year will amount to \$8,500,000, it is expected. The work has been in progress for some time and will be pushed just as rapidly as possible.

WILLARD HOLDS CONVENTIONS

Cleveland, Ohio, May 17—The Willard Storage Battery Co. has held fifteen conventions recently which were attended by more than 1300 dealers. The Willard company's new motion picture, "Through Service We Grow," was shown. This is the slogan of the company. Around it is built the story of a Willard dealer who developed under the company's course in service. Willard maintains a school at Cleveland for service station dealers, where the best methods of the battery business are taught. The screen story shows how a dealer puts into effect what he learns there and how he prospers as a result.

OLD INTER-STATE SUIT DISMISSED

Muncie, Ind., May 19—The three-yearold Rutenber-Inter-State suit was dismissed by order of court May 8. This suit dates back to 1916, when on Oct. 18 the Rutenber Motor Co. of Marion was sued by Inter-State of Muncie at Indianapolis in the United States district court. The action attracted much attention among parts makers because of the various elements for which large amounts were claimed for alleged losses.

ACASON ADDS MODEL

Detroit, May 17—The Acason Motor Truck Co. has added a 1½-ton truck to its line. Specifications include Waukesha engine, Timken worm drive axle, Blood Brothers universal joints, Detroit springs, etc. Tire equipment will be either 35 by 6 front and 38 by 7 rear pneumatic cord tires or 36 by 4 front and 36 by 6 rear solid tires. Drive will be left hand to meet the demand the company has for chassis to be used in bus service.

Certified Checks Help Sharper Victimize Dealers

BOSTON, May 16—A man styling himself Frank Adams and claiming to be an attorney at Philadelphia wrote letters recently to dealers in Boston stating that he had seen advertised certain cars among their used vehicle lists, and as he was coming to Boston to try an important case he would look in on them and see the cars advertised. He came along, very suave, and at three places so far as known he picked out fine cars, a Locomobile, Pierce-Arrow and a Packard.

He handed out checks, certified of course, and managed to get away with the three machines. The checks came back. Then the dealers woke up and notified the police. A few days ago they were notified that the man had been arrested at New York and the cars recovered. Also that he had put over some alleged crooked deal in that city and they were holding him there. But the Boston dealers were not interested in that part of it so much as they were to get back cars that were sold approximately at \$3,500 each. They have been keeping the matter quiet so as not to admit they were so easily fooled, and they are wondering if any others were victimized.

WORKING THE WAR CAR SWINDLE

Bloomington, Ill., May 17-Swindlers are working the Illinois territory, offering to sell motor cars, discarded by the war department, for \$350, of which \$150 is cash and \$200 to be turned over when delivery is made. The salesmen carry forged credentials of the Government and stipulate that the buyer must not sell the car; must not change the color for upwards of one year, nor tell anyone how the machine was obtained. It is said the swindlers have been making their headquarters in St. Louis and that the total proceeds so far are not less than \$50.000. A letter has been received from H. L. Rogers, quartermastergeneral of the U.S. A., and director of purchases and supplies, stating that there will be no new cars for sale, and, for the time being, there will be no second-hand cars to be disposed of. If there should be a surplus of new or second hand cars, they will be turned back to the manufacturers to be handled through the regular trade markets, as told several times in Motor

PLANS TITLE DEED FOR CARS

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Springfield, Ill., May 16-There has been introduced in the Illinois legislature a bill which may have a tendency to reduce the number of thefts of motor cars. The measure provides that no motor car may be sold in Illinois without a bill of sale containing the name and address of the purchaser and a minute identification of the car as to factory and engine numbers, etc. The bill of sale must be recorded with the secretary of state and will be placed on record. Each garage is required to make a public record of every car handled, giving the engine number and other details as shown in the bill of sale. All engines found without their original number, must be junked. The proposed law will make it difficult to dis-

New Tricks of Motor Car Thieves and Plans for Beating Them

pose of stolen cars in this state but will likely have a tendency to move them to some other state where detection is less likely.

POLICE NEED BINOCULARS

Springfield, Mass., May 16—There is talk among motorists of the state of presenting to some of the lynx-eyed sleuths here some high-powered field glasses so that they may get the numbers right of motorists they report for speeding. A few days ago a member of the Highway Commission got a letter at Boston warning him to drive more carefully through Springfield, as his car was reported speeding there. He had not been there and his car was laid up, so he sent the police a note to be careful of picking out numbers.

Now comes another joke. The owner of a motor sawmill, capable of going about 10 miles an hour, received a warning about his speeding. The mill has never been 10 miles from the owner's home, for it operates in the woods some 50 miles away from Springfield, near Worcester, and friends of the operator are thinking of drawing a cartoon of what a sawmill auto might look like in a hurry so the Springfield police may not be mistaken again.

FELONY TO STEAL CAR IN PA.

Harrisburg, Pa., May 16—Governor Sproul has approved the Hollingsworth house bill making it a felony hereafter for anyone to steal a motor vehicle in the state of Pennsylvania. The measure increases the penalty for such thefts, and for being accessory thereto, or receiving or buying a car known to have been stolen, to a maximum of \$5,000 and 10 years in prison.

UNIFORMS TO THWART THIEVES

St. Louis, May 17-Licensing and regulation of watchmen of motor cars parked in public places in St. Louis is provided in a bill introduced into the Board of Aldermen to curb car theft and petty pilfering from cars. Any person is forbidden under the bill to act as caretaker of a motor car parked in a public place where parking is permitted free of charge or to enter, handle or touch any part or equipment of, or any property in, a parked car unless he has been licensed by the Board of Police Commissioners to serve as a watchman or unless he is the owner of the motor car or has been authorized in writing by the owner to act as caretaker. Such licensed caretakers must wear uniforms and display badges prescribed by the police board.

NEW METHOD OF CAR THEFT

New York, May 19—A new method of stealing motor cars against which the motor car owner is not protected has recently come to light. The thief first finds

a prospective purchaser, and poses as a dealer in used cars. He finds out the particular kind of motor car the prospect desires, and how much he wishes to pay for it. The thief assures him he will be able to supply him in a few days but at present has none of that make on hand, and he then sets out to find the victim owning the kind of a car the prospect wishes and the most convenient time and place to steal it.

The owner who is careless about locking his car, or parks for extended periods is an easy victim, and the thief, after selecting the car, secures the motor and factory numbers. He then procures a license from the secretary of state's office, if the licence clerk is not an expert. He goes back to get the car, knowing the owner's lack of punctuality in removing it, drives far enough to change license plates, and then is ready to meet his prospect.

After the demonstration, the prospect, finding the car satisfactory, hands over the check or cash and obtains a bill of sale. The shrewdness of the license clerk may check the thief in obtaining a license, and spoil his game.

SERIOUS GAS SHORTAGE UNLIKELY

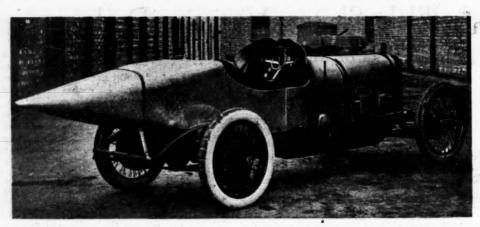
Chicago, May 17—According to local Standard Oil officials there is no immediate danger of a serious shortage in the gasoline supply. This despite the fact that there is a real shortage of crude oil, considering the refining capacities of the country.

The shortage of crude is estimated to be as high as 50,000 barrels a day in the Mid-Continent area alone. There are at present and in process of construction, refining capacities in the Mid-Continent and Texas areas for 825,000 barrels of crude daily. The production of crude from all sections available for this maximum of capacity admittedly is short, and if the country were dependent upon the daily output of the refineries for its gasoline there would be some cause for alarm.

This is not the case at the present time, however. According to Standard there are considerable stocks of gasoline in store, sufficient to meet the demand which will come immediately the weather warms up and cars begin to be used to their maximum. The saving factor in the situation has been the weather, which has continued cold and inclement and which has prevented the consumption of gasoline normal to this time of the year. With the present stocks on hand and the production of the refineries, irrespective of the admitted shortage of crude, there is no reason to be apprehensive about a shortage.

TO MAKE CORD TIRES

Cleveland, Ohio, May 16—In addition to its regular line of Greyhound tires, which are guaranteed for 6000 miles on large sizes and 7500 miles on Ford sizes, the Ideal Tire & Rubber Co. is planning to put on the market a cord tire about June 1. The company since the first of the year has received orders and contracts for approximately \$4,000,000 worth of tires.



One of the Sunbeams that will race at Indianapolis

Drivers Check In for Indianapolis Event

Practice on Speedway for May 31 Race Has Begun

NDIANAPOLIS, Ind., May 19-Practice on the brick oval for the 500-mile race May 31 is under way in earnest, with new drivers and cars checking in every day. The contingent from Uniontown is expected to arrive within a few days now that the Pennsylvania event is off the cards. Uniontown held a good many of the speed merchants who otherwise would have been at practice in Indianapolis before this.

Practice on the speedway already has developed a number of thrills for the railbirds, the most exciting of which was a near accident to Rene Thomas, winner of the 1914 Indianapolis, 500-mile race who narrowly escaped disaster during his first dash around the track in one of the new Ballot cars that are the dark horses of the coming event. The shock absorbers on Thomas's car had not been tightened sufficiently to take care of the rebound caused by a tricky wave in the track.

Thomas, on his first trip around the course, hit the wave at a high speed and was thrown a foot into the air with his grip on the steering wheel as the only means of support while his car entered a dangerous swerve that usually means a spiral spin on the embankment of the track and often a crash at the end. The French driver got his car straightened out and stopped without injury. After tightening the shock absorber he speeded up for several laps without trouble.

Cars Hide Speed

The first appearance of the Ballot cars on the track was devoid of information to the railbirds, as Thomas was very careful not to pass any measured distances at speed. In this, he followed the same tactics as did the Sunbeam drivers on their first appearance who jockeyed their mounts continually to throw off any possible observers.

It is evidently the intention of the entire foreign contingent in the Indianapolis race to postpone a showdown of their hands as long as possible, even to the extent of exhibiting no more speed in the elimination trials preliminary to the event than is necessary to stay in the running. Even this will make them step a few, of course, as there is hardly a car in the race that is not capable of a sustained speed of better than 100 m.p.h. However, the foreign cars are reputed to be faster than 120 m.p.h. and consequently still will have a lot in reserve, how much no outsider will probably know until the day of the race.

Among the latest arrivals for the big event is Lieut. Arthur Klein, American aviator, who will rule as one of the home favorites for first honors. Klein recently returned from Issoudun, France, where he had charge of the largest group of Libertyengined planes in the foreign service, in the capacity of engineering officer. He is a full-fledged pilot and was deprived of his chance at actual fighting only by the armistice, which was signed while his transfer to a pursuit squadron was going through the official channels.

Klein brought with him the French Peu-

YOU CAN'T TELL ABOUT THE RACES WITHOUT NEXT WEEK'S MOTOR AGE

Borrowing the slang of the program venders in the speedway grandstand for those at the races, it applies equally well to readers not fortunate enough to attend the first big speed event of the season at Indianapolis, May 31, the biggest publicity event of your industry. The feature story of the issue of Motor Age for May 29 will be the illustrations and descriptions of the cars and photographs and past performances of their drivers, together with an intimate discussion of those features of the cars which make them of winning

HOW AND WHY THE RACE WAS

will be the leading article in MOTOR AGE the week following. A staff of writers and photographers, each with a special phase of the race to cover, will provide first-hand information of how and why this car won and that one lost in the June 5th

geot he will drive for Frank P. Book, the Detroit millionaire, in the coming contest, and also checked in the Detroit Special entered by Book, for which no driver has as vet been nominated, however. His experience in France seems to have done him a world of good, placing him in the best shape of his career.

Foreign Racers Arrive

New York, May 16-Another contingent of French racing drivers for the Indianapolis race arrived on the steamer Espagne yesterday and consisted of Louis Wagner

(Concluded on page 31)

Milton Is First in the Uniontown Race

Postponement Cuts Crowd That Sees Close Finish

egram-Tommy Mis. placed his mark beside those of Louis Chevrolet and Ralph Mulford upon the Universal trophy by winning the Victory sweepstakes of 100 laps, 1121/2 miles, on the Uniontown speedway this afternoon. Milton made the race in 1:10:09.32, an average speed of 961/2 m.p.h. Chevrolet came in second, making the last lap on the rim with a tire down, and Mulford had no difficulty in taking down third money.

The third annual opening of the Uniontown speedway was postponed from Saturday because of rain and about 10,000 persons saw the races to-day. The speedway management had expected 20,000 for Sat-

Two spills by Joe Thomas, Mercer, and Omar Toft, in a Toft special, together with aerial gymnastic stunts provided the thrills

I NIONTOWN, Pa., May 19—Special tel- for the afternoon's program. Both spills occurred in front of the grandstand in the fifteenth lap. Thomas blew a tire as his mount was coming out of the northwest turn, while Toft lost a tire as he was entering the northeast turn. Thomas' car whirled around the apron several times and was brought to a halt against the inner guard rail. Toft's tire went bounding around the turn but he also negotiated his car down the apron and into the guard rail. Neither car overturned. Toft got back into the race but did not figure as a contender while Thomas retired.

Fourth place went to Cliff Durant in a Chevrolet special Fifth went to Boyer in a Frontenac, sixth to Lecocq, in a Roamer, seventh to Hitke in a Roamer and eighth to Hickey, Stickel special. Cars not finishing were Omar Toft, Toft; McCarthy, Hud-

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Sunbeam Designer Talks on Racing and Its Future Abroad

Louis Coatalen, on His Way to Indianapolis Speedway, Has Much to Say on the Future of Racing in Europe—He Is Known Internationally as the Designer of Twenty-Two Types of Aircraft Engine

By Ernest A. Stephens

OUIS COATALEN, well known on this side of the Atlantic as the designer of the Sunbeam cars, is here on his first visit to the United States. He has come primarily to look after the interests of the Sunbeam team at Indianapolis, but he also looks upon his trip as marking the close of years of active work which has been intensified tenfold during the war. Coatalen is still on the sunny side of forty, but he has crowded the work of an average lifetime into the last four years. He feels he needs the rest due to the war-weary and he hopes to see his car win the 500-mile race at Indianapolis on May 31 before retiring from active service as managing director and chief engineer of the Sunbeam company. Incidentally he has watched the growth of that company from a concern employing 300 men to one which is operating with 6000 on day and night shifts.

Coatalen has very little to say regarding the two cars which he has entered for the big race. He admits that to outward appearance they are similar to earlier models with the solitary exception that wheelbases are shorter, but that the similarity ends there. We may learn later on what mechanical improvements and refinements have been incorporated, but not even a friendship extending over nearly twenty years proved sufficient to obtain any advance information.

Successful racing, says Coatalen, depends on correct basic design, plus expert final tuning up and extra attention to details up to the last moment. It is in order to give these personal touches that he has come. As he says, "I am not satisfied because Sunbeams have not hitherto done as well in America as they have in Europe." He believes that they should do better and he is starting for Indianapolis with the idea that he can attain his ideal.

In his quaint Anglo-French way (and despite his years of residence in England Coatalen is essentially a Frenchman) he says that although the Sunbeam cannot equal its performance in the French Grand Prix of 1912, where it took first, second and third places, it is only for the reason that he has but two cars entered for Indianapolis.

The Value of Racing to the Designer

"Racing is the school for progress—the car maker who ignores racing is like an ostrich with his head in the sand—if you don't race you go to sleep and get left in the commercial race—the next best thing to winning is to get such a thorough beating that you sit down to think—" These are a few of Coatalen's epigrammatic remarks, constituting his confession of faith in racing.

Naturally he spoke from a European point of view but he gave additional force to his remarks by referring to the passen-

ger car in war. He stated that the only staff cars of European manufacture which stood up under the extremes of services on the western front were built by men who had raced continuously prior to 1914.

Another tribute to the value of racing to the designer was paid by Coatalen. He points to the twenty-two individual types of aircraft engine which he personally designed, tested and put into quantity production. Every one of these, he said, were constructed on experience and knowledge gained in following the racing game. These engines were used in fighters, bombers, blimps and dirigibles. Sunbeams are used in the dirigibles with which England hopes to make the transatlantic passage.

The Future of Racing in Europe

According to Coatalen, racing in England and France will be resumed as soon as makers/can produce cars. As a matter of fact the Royal Automobile Club of England has already issued one permit, but the race had to be called off as no cars could be made ready in time. It is, however, probable that this race, on lines similar to the Tourist Trophy series of former years, will be held in the Isle of Man during the summer. The course is almost around the island, at one point it crosses a 3000-ft. mountain and it has many dangerous corners. The terrors of the famous "Hairpin Corner" on this course are known to many drivers.

Brooklands, the only English speedway, is in bad shape. Its surface has been cut to pieces and its foundations wrecked by the testing of military trucks during the past four years. Efforts are being made to restore it, but it is hardly likely that it will be ready for racing before 1920. Road racing is not permitted in England and in the past it has been usual to hold speed contests and tests on Scottish or Irish roads. The future, from this point of view, is uncertain.

France has made tentative arrangements for holding the Grand Prix in 1920. The location of the circuit has not been decided, but it is likely that a course will be selected in Alsace-Lorraine-the first French race to be held in the recovered territory. Details are unsettled, but it is probable that it will be what is known as a "three-liter" race. This means that the capacity of the engines must not exceed three liters, equivalent to 183.06 in. Italy will, no doubt, re-enter the racing game as soon as may be possible. The industries of the various countries are in a very unsettled state, reconstruction on normal lines will be slow and racing must wait developments.

Coatalen is no mere engineering theorist on the subject of racing. Thirty-three silver cups testify to his ability at the wheel and he has held a twelve-hours world's record. All these performances were abroad. He has also done much motor

boat racing, principally at Monaco in the Mediterranean and is now engaged in developing a 70-mile boat with two 400 hp. airplane engines. He expresses the opinion that automobile racing will be resumed on a big scale in Europe just as soon as conditions warrant.

Unless there is promise of more racing in the United States, Coatalen plans to return to England immediately after Indianapolis, taking the two Sunbeams with him. Almost immediately he will start on the long vacation he has planned. He will still keep in touch with automotive matters as a designer, retaining his directorship and acting in an advisory capacity to the Sunbeam company from his new home in Paris. He feels he has earned the right to a long rest, he would be termed a millionaire in America or a multi-millionaire in France and he is looking forward to spending his winters on his yacht in the Mediterranean-and he's thirty-nine and a few months.

U. S. TRAFFIC POLICE IN PARIS

Paris, April 16—American military police now control the traffic on all the main avenues and boulevards of Paris. The Americans are paired with French city policemen and have authority not only over American drivers but over French, English, Italian and other military cars, as well as over French civilians.

This scheme has had to be adopted because of the international character of the traffic in Paris and the growing recklessness of drivers. The peace conference has brought into the city more army drivers and more varied nationalities than during any period of the war. The United States is represented by the Army, the Navy, the Y. M. C. A., the Red Cross, the K. of C., Salvation Army, as well as the military cars attached to the peace conference. British have big military, naval and air services in Paris. The Italians are almost equally important, while in addition there are Belgian, Polish, Greek, Roumanian, Portuguese, Jugo-Slav and other missions. all of which have important motor car serv-

If You Were a Farmer

with wheat hovering around the two-dollar mark, oats so high that breakfast foods are luxuries, corn at a dollar or more and making mere gold blush for shame—wouldn't you be as keen on better things as you are to-day in your own sphere?

Once it was "a campaign of education."

Now it's a question of advantages, economies, freedom from labor shortage.

Can you imagine the modern farmer, who rides to town in his six-cylinder car, refusing to give his dollars a tractor excursion over fields that have more potential richness than like areas in the mining camps?

New Tractor Rating Proposed

Standards Committee Offers Formula as Basis for Comparison

FROM the time of the first tractor demonstration to the present day there has been a chaotic condition in the rating of tractors. There have been efforts here and there on the part of some makers and individuals toward arriving at some means whereby tractor engines could be rated with a fair degree of accuracy. Time has shown that field demonstrations cannot be used as a basis of comparison, for conditions vary too much. Therefore, to get tractor engine ratings on a more uniform basis, to get more conservative ratings and to get those states where legislation on tractors is now pending toward uniform action, the Tractor Standards Committee of the S. A. E. met in Chicago May 9 and recommended a formula that appears to be a decided step toward the solution of this problem. The suggested formula is as follows:

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13,000

where D is the diameter in inches of the cylinder bore; L, the length of stroke; R, the number of revolutions per minute, and

N, the number of cylinders.

In this case the 13,000 represents the cubic inches displacement per minute per horsepower. Under the present rating of tractor engines the piston displacement runs anywhere from about 9,000 to as high as 16,000. An average taken from twelve different makes of tractors shows a displacement of about 12,696, based on the Columbus tests in 1918. It also is true that the concerns making tractors in any quantities are the ones whose engines come closest to this figure. Obviously, if the proposed scheme for rating tractor engines is put into effect, it will mean a change in the rating of some tractors where the displacement is figured on a piston displacement of less than 13,000 cu. in. per minute per horsepower.

Good Start at Least

While it is true the new formula may be only temporary, nevertheless it offers something for the whole industry to think about and pass judgment on one way or another. Time will determine whether or not the formula should be reduced or increased. In any event it will be necessary to re-rate tractors whose ratings are now based on less than 13,000 cu. in. to comply with the Nebraska and other state laws.

After looking over the results of the Winnipeg, Salina and other demonstrations it appears foolhardy to try with any degree of consistency to rate tractor engines from the results obtained in the fields on account of the varying conditions. What the tractor makers, dealers and farmers are after right now is some suitable basis for making a comparison, something tangible to work on.

After considering many proposed plans for bringing this about the committee felt that the best proposition at the present time would be a method similar to that used in raising the engines of motor cars and trucks, using, of course, a different formula. While it is true that one make of motor car may out-perform another make of car with the same rated horsepower, under the present system of licensing under the N. A. C. C. formula, we at least have a basis of making comparisons. The universal adoption of this formula for motor cars and the apparent satisfactory way in which it is working out spells some hope of getting satisfactory results in the rating of tractor engines under the proposed formula pre-

Four things the proposed tractor rating formula would help do:

- -Get tractor engine ratings on a more uniform basis.
- -Get more conservative ratings and eliminate tendencies to overload.
- -Make it easier for the farmer to select a tractor for his particular needs.
- Get a uniform licensing method for tractors in states where legislation is pending.

sented at the Chicago meeting. The men present at this meeting do not say they have the final solution of the problem, but feel that they have at least opened the avenues for discussion toward getting what the industry has so long sought.

The proposed rating would establish a definite single basis on which makers could rate the ability of their tractors and incidentally make it much easier for the purchaser to make a selection of a tractor commensurate with his needs. It would overcome the too-common error made in some localities where a farmer gets on his hands a tractor either considerably over- or under-rated for his work.

Motor car engines are rated on about 11,733 cu. in. displacement per minute per horsepower and from the fact that cars invariably use gasoline for fuel and the duty is much less than a tractor engine, it was the consensus that a displacement of 13,000 cu. in. per minute per horsepower should be used in the proposed tractor rating formula.

At the meeting it was thought desirable, in fact, deemed necessary at the present time, to agitate this formula so that decisive action might be taken to protect the tractor industry and so far as possible influence the various states where legislation is pending to enact laws which are consistent. Full consideration was given to the action taken by the tractor division of the National Implement & Vehicle Association, which requested the Department of Agriculture to test tractors and give them a certified rating.

Also, after considering the results of many contests, it was decided by the committee that a drawbar rating of 50 per cent of the engine rating would be safe under average conditions under which tractors are operated and is in line with most of the present-day ratings.

Representatives of the International Harvester Co., Advance-Rumely, Aultman-Taylor, Parrett Tractor Co., in addition to other members of the committee, including Professor Chase of the University of Nebraska, were present.

MAY HALT TRACTOR IMPORTS

Paris, April 25-Farm tractor imports into France will be prohibited July 1 if French makers are in a position to meet national requirements, is the official statement made by Minister of Ravitaillement Boret. Not only are tractor imports permitted now but the Government is buying American machines and selling them to groups of French farmers.

In addition the Ministry of Agriculture is offering a subsidy equal to half the cost of the machine to purchasers of tractors who give the necessary guarantees that the tractors will be kept at work. It is doubtful if the French makers will be in a position to meet requirements by the date in-

TRACTORS IN DENVER TRIALS

Chicago, May 16-The tractor demonstrations at Denver promise to be of unusual interest, and the following makes of tractors will participate:

All-Work, Aultman-Taylor, Avery, Best, Bullock, Case, Cleveland, Eagle, Emerson-Brantingham, Emerson-Brantingnam, Fair, Fordson Four-Drive, General Motors (GMC) Wheat,

Holt, Illinois, I.H.C., Lauson, Leader, Moline, National. Parrett. Parrett, Rumely, R & P, Sandusky, Twin-City, Turner, Wallis. Wisconsin, Weterloo Boy,

PENNSYLVANIA TRACTOR TRIALS

Harrisburg, Pa., May 16-Pennsylvania is to hold four two-day tractor demonstrations during the coming season. These will be held in different sections of the state. Representatives of various tractor companies have agreed on the schedule, but there is a little uncertainly regarding the rules covering these demonstrations as some of the tractor makers want to furnish their own rules and the state department feels that it should have a voice in framing

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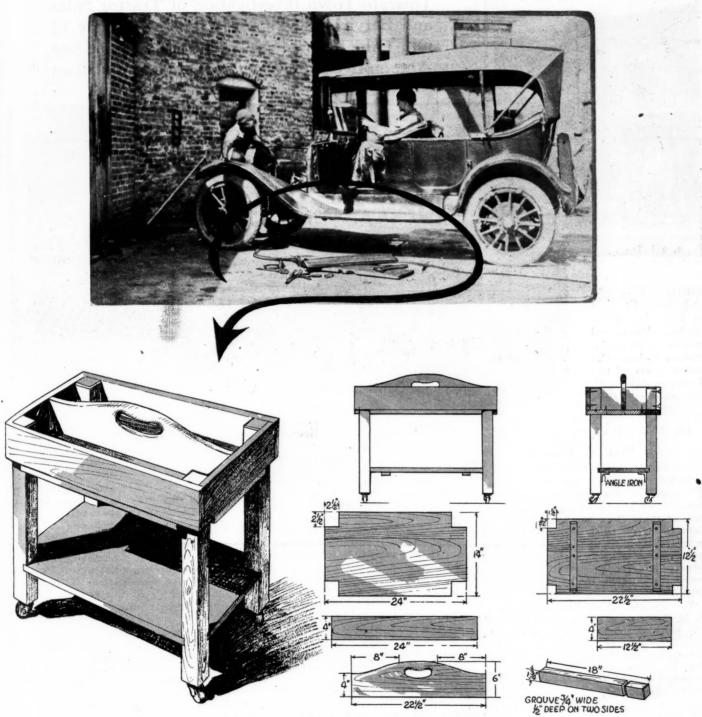
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Adapting Tea-Wagon Idea to the Repairshop

Suggestions for Motor Car Dealers and Repairmen



The tea-wagon idea as adapted to the repairshop

It is not uncommon to go out into any town and see just what you see in the photograph above, that is, tools lying on the ground, as in this case, or on the floor of the garage, if the work happens to be done inside. From this we do not mean that the tools necessarily are going to be damaged, although there is something in that too, but it is bad practice generally.

In the first place, it looks very bad to a customer to see a lot of tools and parts strewn all over the place, with the attendant grease and oil which such ap-

paratus always carries with it when a job is worked on. The result is the floor or sidewalk is covered in a short time with grease spots; anything but inviting.

But aside from that, it means the mechanics have to stoop over every time they pick up a tool, unless they do what is done in many shops, namely, lay the tools and parts on the running-boards or on the upholstered seats of the owner's car. Make it easy for your mechanics to work and at the same time present an air of neatness to your shop. If you have to do a lot of your

work on the curb, make a shop wagon like the one above. It will keep all the tools where they belong, make it easier for the men to do the work and incidently make your customers think rightly about your business.

There is nothing difficult about making this adaption of the tea-wagen and the dimensions will meet most cases. If you care to, you can divide the tray into smaller sections for cotter pins, washers, assorted bolts and nuts, etc. At any rate, try the tea-wagon idea.

Automotive Dealers in Iowa

Town-to-Town Investigation of Tractor Sales and Service Shows Contrast in Attitude of Old-Time Implement Man and Up-to-Date Automotive Merchant and His Service Plant



IN TWO PARTS—PART II

Starting from the Pella Motor Co. plant at Pella, Ia., with a Moline - Universal tractor on the service truck. Below, the sales room of the Fordson dealer, F. LeCocq at Pella

By Fred M. Loomis

Motor Age Editorial Staff

FIFTY-TWO years ago two brothers started in the implement business at Boone, Iowa, and for 40 years or more the firm of Crary Bros. has been one of the bulwarks of the retail implement business in central Iowa. In all that section no firm was better or more favorably known and none did a bigger implement business. The concern still ranks in the minds of old timers as an implement concern.

The manager of the business to day is A. M. Crary, a son of one of the founders. The style of the firm has been changed from Crary Bros. to the Crary Motor & Implement Co., and changed with reason. Last year the business done by the company amounted to \$208,000, made up of the following items:

Motor cars															. \$100,000
Auto parts a	nd	8	C	ce	SS	0	r	ie	S						. 36,000
Auto sundrie	8														. 9,000
Tractors															35.000
Horse-drawn	Ve	h	ic	le	5.										. 6,500
Implements .															. 21,500
Make 1															

IN OTHER WORDS, \$180,000 OUT OF A TOTAL BUSINESS OF \$208,000 WAS AUTOMOTIVE.

The Crary company sells Hudson, Chalmers, Overland, and Chevrolet cars, Republic trucks and Waterloo Boy, Wallis Cub and Advance-Rumely tractors—too many lines, says Mr. Crary, but all are good and he cannot make up his mind which to drop.

The company began in the tractor busi-

ness 4 years ago and now has forty-three tractors out, twenty-three of which were sold personally by G. E. Lebo, a specially trained tractor man whom Crary has had the wisdom to put at the head of the tractor department. The company has a well equipped repair department with three mechanics, service trucks and all the paraphernalia which makes for first-class and prompt service. Manifestly, the Crary company is the dominant factor in the tractor trade here.

T. J. Miller & Son, hardware and implements, sell I. H. C. trucks and tractors and the Moline-Universal tractor. The company operates a service truck and the junior Miller specializes on tractors.

G. B. Keenan sells Mitchell cars and the Emerson-Brantingham tractor, but he has not been at it long enough to estimate.

The Boone-Buick Auto Co., controlling four counties, sells the Buick cars and the Samson tractors. The company has put out ten Sieve Grip tractors, mostly through sub-agents. What the future of this concern will be in the tractor trade is problematical.

The H. C. Payne Auto Co., with Maxwell, Chandler, Reo and Franklin cars, just has taken on the Parrett tractor. Nothing much has been done to date. Payne has courage, however, for a few days ago he entered a stiff competitive contest against a number of other tractors and pulled down the persimmons.

The Crow Motor Co., a Swaney branch, has the Ford and Fordson. The company put out five Fordsons last year and is pre-

paring for an aggressive campaign this year.

In Boone it must be admitted that the automotive dealers score again.

Ames, Iowa, was given the honor of opening this story and it is unnecessary here to mention the town again.

Marchalltown, Iowa

At Marshalltown, at the present time, the strongest factor in the tractor trade is the Marshall Implement Co., an exclusive implement and seed concern. The company handles the I. H. C., the Case and the Wallis Cub tractors. In all it has some thirty-five machines out.

The company maintains no repairshop, however, although service cars are operated and a special service man is kept employed. For serious trouble recourse is had to the factory branch houses. No special tractor salesman is employed. The company is handling the business cautiously, however, recommending to the customer that tractor which best will meet the conditions on his individual farm. In some particularly difficult sections of the company's territory the company refuses to sell tractors. A big and well-kept stock of repairs is carried.

A member of the company admitted to me that business last year would have been "on the bum" had it not been for the trade on tractors and tractor machinery. Another significant admission.

Thurber & Thompson, handling implements and the Buick and Oakland cars, sell also the Emerson-Brantingham trac-

tors. Six were put out last year and recently the company took in a carload in preparation for the spring trade.

The Marshalltown branch of the Rude Auto Co., Ford and Fordson, got out eleven machines last year, but expects greatly to exceed this record this year.

In this connection, Marshalltown has been made headquarters for G. L. Wilson, who is the special tractor representative for the Rude Auto Co. and whose function it will be to go from one to the other of the six Rude branches and put pep into the local tractor salesmen.

Ketchum & Co. is the remaining exclusive implement concern here which is interested in the tractor business. The company does both a wholesale and a retail business and has been state distributer for the Bates Steel Mule ever since that particular tractor has been in production. Even so, the concern has not got very far yet. A few Steel Mules have been sold locally, while a somewhat larger number have been disposed of wholesale, but the whole tractor policy of the company is Fabian-wait, the tractor as yet is not a thoroughly de-

pendable and satisfactory proposition and "we do not want to get in too deep until we can be sure we are right, then we are prepared to go ahead and push it."

THE ATTITUDE OF KETCHUM & CO. IS IMPORTANT IN THIS STORY FOR THE REASON THAT IT IS TYPICAL OF DYED-IN-THE-WOOL IMPLE-MENT CONCERN AND GOES FAR TO EXPLAIN WHY THE IMPLEMENT TRADE AS A WHOLE HAS NOT TAKEN MORE KINDLY TO THE TRACTOR AND WHY IT HAS NOT BEEN MORE ENER-GETIC AND SUCCESSFUL IN SELL-ING IT.

The dominant spirit in the firm of Ketchum & Co., is Ed. S. Ketchum. Now I have known Ed. Ketchum for a long time. A good many years ago, so many that neither he nor I like to think of them, both he and I traveled on the road selling implements for the same concern. He has consistently remained all these years wedded to the implement business. I drifted away from it. He still maintains unimpared the old implement way of looking at things; the logic of events compelled me

to modify the ideas I once had. Yet, having held the same notions once upon a time, I believe I can understand and appreciate Ed.'s present point of view. It is:

"The implement manufacturer always has been a good old scout and always he has taken care of the dealer regardless of the consequences to himself. Once having made a contract, he stuck to it, regardless. If prices on material and labor went up, he absorbed the increase, sometimes at large loss to himself rather than interfere with the obligations toward the dealer he had undertaken. If the prices went down he gave the dealer the benefit of it. If he put out a machine which failed in the field he replaced it without question, even to the extent of financial disaster to himself. No one ever heard of an implement manufacturer repudiating a contract even if he went broke keeping his

"Now he comes along with a tractor, which is by no means a perfect machine, and he wants to sell it to the dealer in a way which is contrary to all the traditions and practices of the implement trade. Tractors are so far only experiments, but the manufacturer wants to continue to experiment at the expense of the dealer and the farmer, and the dealer can't understand it because he never has been asked to do business that way by the implement manufacturer before. That's why we are not pushing the tractor harder than we are and why we won't until we are sure that the machine can be depended upon. From the point of view of the implement dealer it does not look fair to put the cost of developing the tractor on the dealer and most dealers feel pretty much that way about

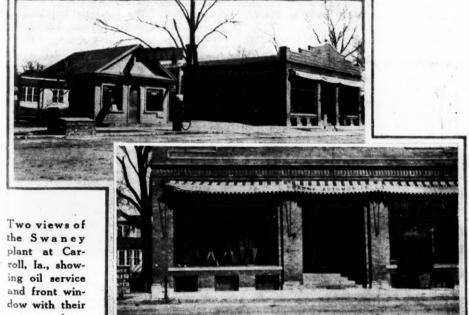
The Implement Trade Feeling

That goes very far to explain the feeling so commonly found in the implement trade. Always there has been in the implement trade a strand of paternalism which has run through the warp and woof of the business. The relations between the dealer and the manufacturer have had a personal sentiment in them, more so perhaps than in almost any other line of business. The dealer did not buy his implements from a cold-blooded corporation, he bought them from a man. That's what made the names of John Deere, Cyrus McCormick, William Deering, James Oliver, David Bradley, "Bill" Parlin and others which might be included, as familiar as family names in every implement household in the land. These men and others like them took a personal interest in the dealers who sold their goods. They financed them; they favored them; they gave them the best of the deal.

To one who understand this, the surprised and resentful attitude of so many of the old-time retail implement dealers toward the newer ideas of doing business which have come in with the tractor also is understandable. But the dealer can't understand it and he won't. And because the trade policies of the tractor manufacturer apparently run counter to what always has been regarded as the right policy in the implement business, the dealer refuses to subscribe. He wants the manufacturer to treat him in the matter of tractors, repairs and service, just as he has been treated by him in the past, and because the manufacturer



Looking down motor row at Cedar Rapids, Ia., past the Rude Auto Co. plant



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Model service station which A. C. Brockmann is equipping at Manning, Ia.

refuses to do that, the dealer refuses to play. That's all there is to it and that's why, to a great extent, the implement dealer of the old school has not been conspicuously successful in the tractor business.

The more modern dealer, the automotive dealer and the motor car dealer, are unhampered by either tradition or sentiment in the matter. They accept conditions as they find them. They see nothing especially outrageous or unjust in the demands of the manufacturers and that's why they are so rapidly gaining control of the tractor business.

Cedar Rapids, Iowa

At Cedar Rapids the dealers, both implement and automotive, are more interested apparently in the wholesale distribution of tractors than they are in disposing of them at retail. M. H. Albertson, who runs the Square Deal Implement House, is the only exception. The Square Deal is an exclusive I. H. C. house and handles the Titan. As usual, there is no service equipment with the exception of Albertson's own mechanical ability and his suit of jumpers.

Bret Arton, retailing power farm machinery almost exclusively, has eastern Iowa on the Hart-Parr and spends most of his time out on the road. He went into tractors only last fall and has some half dozen out in the vicinity of Cedar Rapids.

The two concerns which really are making a stir in the tractor business here are the Murphy-Cadillac Co., with the Moline-Universal, and the Rude Auto Co. with the Fordson. Both concerns are distributers. Murphy has several counties and is building up an organization. His theory is that if he can inspire his sub-dealers he will make good. He sends his dealers to the fountain head of inspiration, the factory, and has had eleven of them there so far. He holds advanced and progressive ideas on selling and will be a big factor in the tractor trade in this vicinity.

The Rude Auto Co. is one of the livest organizations in the automotive business in Iowa. Besides the main office at Cedar Rapids the company maintains branches at Belle Plaine, Marshalltown, Maxwell, Nevada and Perry. The Rude Auto Co. is a completely departmentized business and is

operating along ideas so advanced that most remarkable results are being attained. What this company has done and how it did it will be the subject of another and special story.

This concludes a brief report on conditions as I found them in the towns mentioned. By inquiry and heresay I am informed that conditions are much the same in the towns I was compelled to miss, as well as in the towns lying on either side of the route I traversed. For this reason I am inclined to the belief that my experience was typical and what I found to be the facts in the towns I visited personally exist as well in other sections of Iowa. The other conclusions are obvious.

Among these is one that is all important, namely, that in such portion of Iowa as I covered, at least, the automotive dealer is the dominant factor in the tractor trade at the present time, and that, because of his equipment, experience and ability, and by reason of the generally better business methods he employs, he will surely cement his hold more and more firmly on the future tractor trade.

Another fact is obvious. In town after

town, no matter what combinations of implements, motor cars and tractors are to be found, there is one combination which runs all through like a common factor in a series of numbers. This is the combination of Ford and Fordson. As things stand in Iowa to-day the most compact, the most able, the most aggressive, the best equipped and the most loyal organization in the tractor business is the Fordson. One cannot escape the conviction that to-day the Fordson, provided the Ford dealers rise to the opportunity and improve to the full the advantage they now have, has not one serious competitor in the Iowa tractor trade, generally speaking.

There are practically 350 accredited Ford agents in Iowa, practically all of whom expect to sell the Fordson tractor and the equipment which goes with it, which now has been extended to include threshing machines in addition to the line of tillage tools carried hitherto. Considering the character and equipment of this organization and its territorial distribution it is certain it can cut a tremendous figure in the tractor, truck and farm equipment trade in Iowa. In fact, already it does. The only thing which stands in the way of practical dominance by the Ford organization is over-confidence upon the part of the individual dealers. Too many of the Ford dealers are inclined to think the automotive trade will come to them anyway and that it is unnecessary on their part to don jumpers and go after it. Patriotic Impulse Has Waned

The cause of this notion is plain. When the Fordson tractor first got into production and Henry Ford announced state allotments and state distribution without profit, announced as a patriotic measure, the farmers of the country literally fell over themselves to buy Fordsons. Practically all the Fordson tractors sold during 1918 in the corn belt states were bought by the farmers voluntarily, hardly any selling effort being required on the part of the dealers.

Naturally then it is not at all remarkable that a good many Ford dealers think the farmers are still as anxious and willing to buy the Fordson as they were then.

Dealers who think so are certain to be disappointed. The patriotic impulse has waned. The farmers no longer will be carried toward the Fordson on a wave of



Another view of Cedar Rapids' motor car row—Murphy sells the Moline-Universal from the building in the foreground

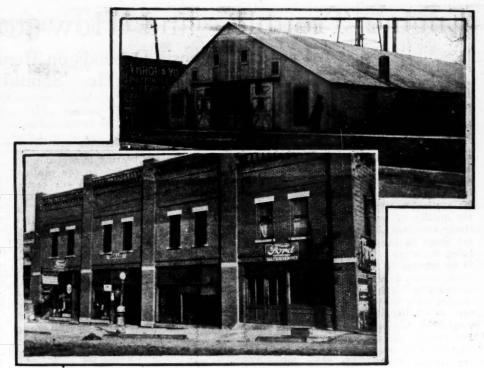
sentiment. Henceforth they will look at the Fordson just as they look at any other tractor and if they buy they will do so because they have become convinced that the Fordson has merit and is a good business proposition. Henceforth the Fordson must be sold strictly upon its merits as a dependable machine and its continued sale will require the hard and earnest effort of the dealers. The latter will have to get out and hustle from now on if they desire to hold their place in the trade.

Other Ford dealers also are too much inclined to rely upon the force of Ford's reputation among the farmers. They believe, or at any rate profess to believe, that just because Henry Ford makes the Fordson tractor the farmers will buy it whether or no. Again the dealers are destined to suffer disillusionment.

Sales Mean Hard Work

There can be no gainsaying the wonderful influence Ford has with the farmers. There is no denying the fact that he enjoys farmer confidence to a remarkable extent. But this is not going to sell tractors. It will help amazingly, it is true, but nevertheless hard and persistent work on the part of the dealers will be demanded, despite the psychologic assistance of this sentiment, to keep the Fordson in the foremost place in the tractor trade.

So, while I am willing to assert that at the present time the Ford dealers in Iowa have the opportunity to make the Fordson tractor the most popular and the most numerously sold of any tractor in the trade, they will miss this opportunity and slip up if they rely upon either patriotic impulse or Ford reputation in place of hard and persistent salesmanship. The Fordson is endangered only from overconfidence on the part of the men who want to sell it.



The usual contrast—warehouse of E. B. Culter, implement and tractor dealer at Jefferson, Iowa, and the sales room of the Jefferson Auto Co., selling the Fordson

The final and unmistakable conclusion is that the tractor trade is tending irresistibly toward the automotive dealer in preference to the old line implement dealer, and it is doing this because the former is the better man. The facts prove this.

It is not contended that every motor car dealer who has gone into the tractor business will make a success of it. Some of them have not been successful as motor car dealers and not in 10,000 years will they be a success as tractor dealers.

By the same token it will be 1,000,000 years before some of the implement men are successful either, and before that length of time shall have passed they will have been a long time dead. Some of them are dead now, only they don't know it.

INTERURBAN USES TRUCK FEEDERS

Milwaukee, Wis., May 16-Pending the extension of its interurban street railway lines at a time when conditions are more favorable, the Milwaukee Light, Heat & Traction Co. has provided freighting facilities in the Rock River Valley of Wisconsin by the institution of a motor truck package freight and express service between its present western terminus at Watertown, Wis., and Johnson Creek, Jefferson and Ft. Atkinson, three important communities to the southward. The electric company has purchased three 3-ton Packard trucks for exclusive use on the express line. Since the establishment of the service each truck has had virtually full loads going and returning every trip.

Watertown is 50 miles west of Milwaukee; Fort Atkinson is 20 miles south of Watertown, Jefferson and Johnson Creek being intermediate points. The trucks made two trips a day, or a total of 40 miles each. Milwaukee shipments delivered to the electric company's express platform by 6 p. m. reach consignees in any part of the Watertown-Ft. Atkinson truck route before noon the following day.

Perhaps the greatest value of the combination street car-motor truck service is that to merchants in the Rock valley, who trade almost exclusively with Milwaukee manufacturers, wholesalers and jobbers, but have a more or less indirect and infrequent steam railway freight service. Mil-

waukee people will benefit largely through the ability to obtain fresh garden truck, dairy products, etc.

This is the first installation of combination express and freight service to be made by an interurban railway in Wisconsin.

K-W LOCK RIGHTS

New York, Editor Motor Age-Last week you published a notice to the effect that the K-W Ignition Co. of Cleveland, Ohio, had won its switch litigation against the Goodrich-Lenhart Mfg. Co. The facts of the matter are as follows: The suit brought by Warren R. Cox, the owner of the patents under which the K-W switch is made, and our suit against Warren R. Cox were amicably settled. Under the terms of the settlement agreement which we made with Mr. Cox we are not only permitted to repair any lock switches that we have sold in the past or may sell for an indefinite period of time but we also are absolutely free to sell a great many thousand lock switches, the amount being so large that under present conditions we can supply our trade for a long period of time, which we approximate to be somewhere in the neighborhood of two years. In addition to the above we would direct attention to the further fact it was agreed under penalty that there would not be interference with our right to sell these lock switches, so that our trade is well protected .- Goodrich-Lenhart Mfg. Co.

SHIPMENTS BEHIND SALES

Washington, May 16—Sales of motor cars would be greatly increased if the factories could deliver in proportion to the demands of the dealers according to statements made by distributers in Washington. With the exception of the Overland dealer, none of the distributers are receiving the sufficient number of cars to meet their sales demands. Overland has been particularly fortunate and is securing cars in quantities that meet the sales demands.

The Packard distributer, the Luttrell Co., received the first car last week for many months from the Packard Motor Car Co. at Detroit. The sales could be increased greatly. it was stated, if the factory could make shipments. Orders for twenty cars are now on the books. Conditions, it was said are very favorable and a prosperous year is anticipated.

The demand for Fords is greatly in excess of production although the Ford branch here stated that shipments from the factory are beginning to come in in better quantities than in the past few years. The outlook for the future is said to be very good.

The Buick and Chandler dealers are considerably behind on shipments and have many orders booked ahead. Sales could be greatly increased if they could get cars. Chandler stated that two or three times as many cars could be disposed of if they could be secured from the factory.

Engine Troubles and How to Locate Them

Proper Diagnosis Depends on Repairman's Experience — What He Should Know

TO be able to diagnose the ailment of a suffering engine in a short space of time and after the inspection be able to say, "Here is the difficulty, and this is the remedy," the mechanic cannot be a novice. Men of this caliber are alarmingly scarce, and the great demand for mechanics is calling in men of little or no experience. Service station managers are complaining of the quality of work that these comparatively new men turn out. The complaints are based on the ground that the repairs being made are of the overhauling nature, in an attempt to remedy some slight difficulty, which does not require a complete overhauling. It seems that sometimes mechanics when in doubt as to the exact nature of the trouble overhaul an engine completely, hoping that by so doing they will remedy the difficulty simply because they touch up every possible trouble-making portion of the engine and will come across the ailing member during some time of the overhaul.

Analyzing Engine Trouble

Hit or miss methods should not be allowed in the modern service station. The proprietor should see that his men work toward a definite end and in a systematic way. In analyzing an engine's difficulties, a good method should be adopted so that no time is lost in tearing down and examining for half a day before actual work can be started. Of course, there are unusual cases where the repairman is at a loss, no matter how efficient he is or how well he knows his business. An illustration of this is brought to mind where a service manager of a factory was called in after everyone else had failed to explain why an engine lost most of its power after it was warmed up to a temperature at which it should have run satisfactorily. A new cylinder block remedied the trouble, and in the old block was found a deposit of core sand which allowed the metal to absorb a greater amount of heat at that place, causing an unequal expansion. This made the cylinder elliptical in shape when it was warmed up, resulting in a loss of compression and a loss

Methods and system though are of little value, if the results a methodical analysis give are not interpreted properly. The proper interpretation depends upon the man's experience and himself. So it remains for the new man to adopt some of the methods that have been discovered through the experience of others, long in the business.

First, it is well to bear in mind that all engine noises, generally speaking, occur at one of two speeds, camshaft or crankshaft speed. As soon as a particular difficulty is thus classed, the rest of the diagnosis is a routine operation. This is easily determined by throttling the engine down very slowly, under load if necessary, to bring out the noise and then noting when the pound occurs every time some particular

nut comes to a certain position as it revolves with the shaft. In every case main bearings produce their noises at crankshaft speeds.

The rear main bearing is probably the heaviest loaded bearing on the car, and should it ever lack oil, it will become known immediately. This bearing carries the weight of the flywheel, weight of the rear part of the crankshaft and in addition must be strong enough to withstand the twisting and weaving effect produced by rapid acceleration. When this bearing wears it allows the flywheel to sag and the shaft becomes slightly out of alignment. When the conditions are such as to allow the play to be taken up at every revolution, the flywheel will bounce up and down in the bearing. This causes a heavy thumping sound. The conditions which cause the wheel to make this sound are a heavy load and slow speed, say, about 5 to 10 m.p.h. If these conditions are to be duplicated in the shop, the rear wheels can be jacked up and the brakes applied, or the brakes can be applied and the power applied slightly by slipping the clutch. This practice is not recommended for it is very injurious to the clutch, but if time is scarce it can be done for a very few moments. While the engine is pounding in this manner, the rear spark plug can be shorted and the noise will dis-

If the bearing is a central one, the pounding noise will not be so much in evidence. It will be of a thumping nature, but not so heavy as the rear bearing. Its presence can often be detected by holding a screwdriver against the side of the engine case. The vibration caused by the loose bearing easily can be felt this way. To eliminate the noise the center bearing makes it is necessary to short the spark plugs on either side of the bearing. This relieves that bearing of its load, and consequently the noise will stop.

Front Bearing Trouble

The front bearing of the engine is not subject to as much abuse as are the other bearings. This bearing is held in the case at the point where the case is bolted to the frame. The front portion of the car frame is subject to very little twisting, so of all the main bearings the front one should be least suspected of causing trouble. The noise it makes is heavy but approaches more of a metallic hammering. It is sometimes very difficult to say it is the front bearing of the shaft that causes the trouble. If the car's construction is such that the front end of the shaft can be reached with a stethoscope, or even a metal rod, the looseness in the front bearing can be determined in short order.

Crankpin and wristpin knocks occur at crankshaft speed and are apt to occur under heavy load more than under light load. Pounds and knocks produced by loose rods are of a light metallic nature, sounding very much as if a hammer were rattling within a cast-iron cylinder. Their location

can be determined in the same way the main bearing difficulties were determined, except there are twice as many possibilities as there are cylinders, two places on each rod where the noise may occur. It is not possible to say exactly whether a noise is at the wristpin or the crankpin. But then this is not so necessary, for the rod to be repaired will have to be removed regardless of which end of the rod the sound is coming from.

The amount of looseness necessary to produce a knock is less than the hand can detect, as 0.001 in. greater than the natural oil film thickness will produce a knock and the hand cannot detect this play, because the oil film acts as a cushion and so deadens the action.

Piston slaps are separate from these other knocks. They are apt to occur at light loads and heavy loads, sounding like a rattle or a pound, at twice engine speed, half engine speed, or at engine speed. This is the reason so many noises are attributed to loose pistons.

Reasons for Piston Slapping

There are two reasons for pistons slapping the cylinder wall. The cylinder wall may have become overheated, due to a lack of oil. This causes the metal to become granulated, and as the piston passes over the injured portion it carries with it these small particles that have become loosened. This calls for reboring or regrinding. The Conother reason is found in warped rods. necting rods warp when overheated. This causes them to exert a twisting force on the boss of the piston and prevents the piston from following the cylinder wall as it should. In either case a piston slap can be located exactly. In the majority of cars the spark lever is set so when at the threequarter advance position the spark occurs at top dead center. If a piston slap is present, it will occur when the spark is fully advanced. With the lever in this position and the engine running to produce the noise, retard the spark slowly. As soon as the spark is retarded to the position where there is no change in the angularity of the thrust on the piston, the noise will stop. This position will be near the top dead center setting. After the noise is attributed to a loose piston, its position can be determined by short-circuiting the cylinders one at a time, until the proper one is found, when the noise will stop.

Camshaft noises are metallic in sound, whether caused by a large bearing or end play in the shaft. If it is end play, the exposed end of the shaft can be pried over with a piece of two by four. This will eliminate the noise caused by end play. If, though, it comes from a large bearing and is the front bearing, the shaft can be forced against the bearing during its entire revolution, thus eliminating the noise. If the center camshaft bearing is making the noise, it will be determined with certainty only after the case is dropped and the bearing brought to view.

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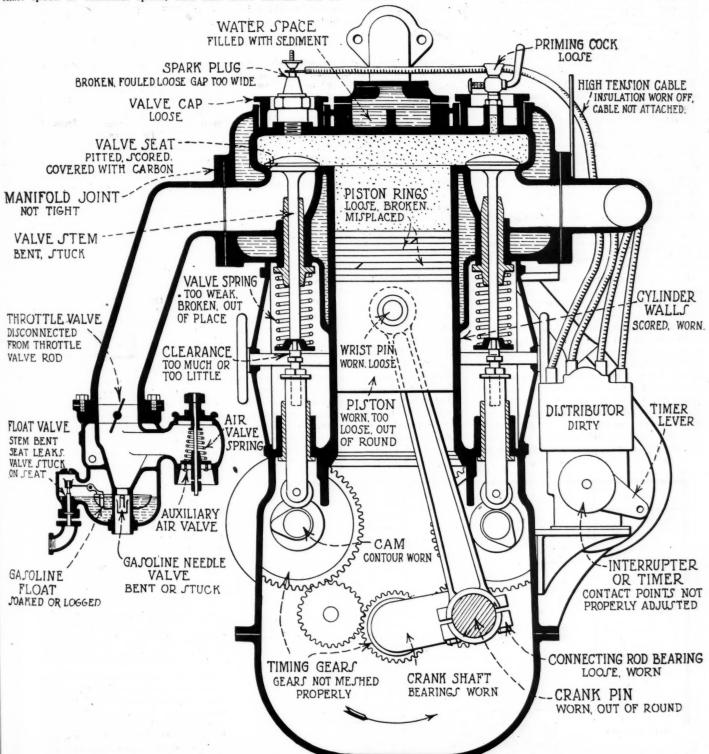
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Engine Trouble Chart

Repairman's Ready Reference for Shooting Trouble

The trouble chart illustrated herewith has been prepared for the repairman and presents in the most simplified manner possible a ference for readily detecting anything unusual. The T-head type of engine is chosen because it lends itself readily to illustration, and permits all the parts to be shown in one sectional view. With the aid of this chart and a systematic method of analysis such as is outlined on the following page, the repairman will have little trouble in diagnosing an engine's trouble. It is well to bear in mind that engine knocks occur at either crankshaft speed or camshaft speed, and that these knocks can be

traced to loose main bearings, crank pin bearings, wrist pin bearings, and in the case of a piston slap to a loose fitting piston. Then there are the camshaft bearings which may produce knocks, but at one-half the speed of those just mentioned. Each of these knocks have there own particular characteristic sound and once the repairman has familiarized himself with what to expect from any of the above conditions, the hit or miss style of shooting trouble may be abandoned for the more desirable method of certainty. Referring to the chart, it will be seen that every part of the engine and what might be wrong with it is noted.



anning arage

No. 50

A Complete Sales and Service Plant

A Complete Sales and Service Plant

Q-Attached is a sketch of lot fronting 120 ft. on 5th S t., on the north, 100 ft. on "A" St. on the west, and ajoining other property on the south and east. I have in mind a reinforced concrete building to accomodate my present business and some increase. We handle three makes of cars, have a \$2,500 stock of accessories, a \$3,000 tire stock and seven in the repair shop at present. I think the salesroom should be large enough to display six cars. The accessory, tires and parts space should occupy about 800 sq. ft. and the shop should be large enough for ten men. I will want a ladies' rest room, men's wash room, office and remaining space for storage.

I should like to have a plan of this showing one-story building and another plan in a two-story structure, the latter to include a paint shap of about 5,000 sq. ft. on the upper floor. Realizing the necessity for daylight in the building, would ask that you show how this con be best obtained on the first floor of the two-story building. The adjoining property is not built close up to the line, but this may be done, and windows in the back walls would then be of no value, unless an alley was left between the two properties. Would a light well running along one of the walls from the back corner with skylights into the first story, give satisfaction?

I favor a glass front along the two streets with a garage entrance from each street. Both streets are about equally traveled. Please advise what height you would recommend for the first and second stories, cost of construction considered, also whether you would recommend for the first and nelevator.—John M. Snyder, Los Angeles, Calif.

Plan No. 1 herewith, is a single-story design with every detail followed out just as

Plan No. 1 herewith, is a single-story design with every detail followed out just as you requested. The showroom is large enough for six cars, the stockroom has an area of 600 sq. ft. and the repair shop will accommodate ten men nicely. Plan No. 2 is the two-story design. The showroom and shop units are laid out about the same as the No. 1 plan but the show room unit is somewhat larger and has a private office added to it, and on the other hand, the shop unit is slightly smaller. If you find it too small, its capacity can be almost dcubled by adding another six or eight feet to its depth, thus permitting two rows of

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage,

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

cars of average depth instead of one. The paint shop seems rather large but you specified 5,000 sq. ft.

A ramp is much more desirable in a building of this size than an elevator, and since it has been possible to work it in without disturbing the design in any way, it is a very desirable feature.

The light shaft you speak of will supply considerable light to the area directly under it but it will not give much to the adjacent space. You will find it more economical, more convenient and generally more satisfactory to obtain the desired increase in lighting by making the ceiling higher than usual. Instead of having it 15 ft. make it 17 or even 20 ft. The higher you make the ceiling the more light you get, provided, of course, that you carry your windows up to the ceiling. However, please don't make the mistake of using a high ceiling and then providing less than maximum window

No. 51

New 75 by 100 Ft. Garage

Q—I am going to build a new garage, 75 ft. by 100 ft., in the center of the block, with one main entrance in the corner of the building. I expect to equip it with water and heat. I want a private office, show room, and sales and parts room, wash rack and battery room. I do not want to use more space than necessary for show room and offices. I am attaching rough sketch, —W. G. Carpenter, Burlington Junction, Mo.

Nearly 60 per cent of the rough sketches we receive have the private office of the owner placed in a conspicuous position in the front window with the showroom behind or at the side of it. It would be just as reasonable for John Wanamaker of New York or Stanley Field of Chicago, to move his private office down into the most prominent section of his show window. We are sure the Fair in Chicago never built its multi-million dollar business by displaying its proprietors. Few people even know who the owners are. They do spend thousand of dollars monthly, however, displaying their goods in their windows and it is your goods, cars and accessories that your customers are interested in. Display your goods, give your prospective customers a chance to see what you have to sell.

Instead of jagging your aisle over to the center of the building you gain more space by continuing straight through. If the wash rack is at the back door there is a passage way across it to the repairshop. The heating plant is under the car display room and is reached by a stairway as indicated.

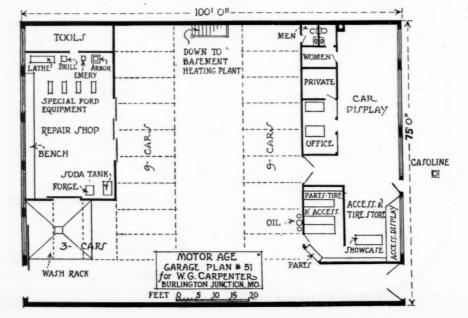
If you think the show room is too narrow the back partition might be moved back as much as 4 or 5 ft. and still have aisle room enough and if most of your stored cars are the smaller sizes, 8 or 10 ft. might be added.

No. 52

Wants Tire Service Layout

Q—On or about May 20 we expect to open a service station in Alton, Ill., for the sale of tires and tubes and repair work of all kinds on them, including retreading, etc. We shall install an Akron-Williams outfit. We should like to have your advice and plans if possible,—E. A. Gill, St. Louis, Mo.

The first suggestion we would make in building a garage is that you leave all the back window space free for the benches, moving the toilet to an 'inside location. Daylight is the most valuable thing you have in a tire shop. You will get all the artificial light you want on dark days, short winter days and overtime night work dur-



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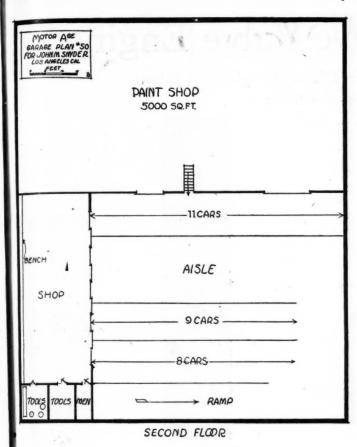
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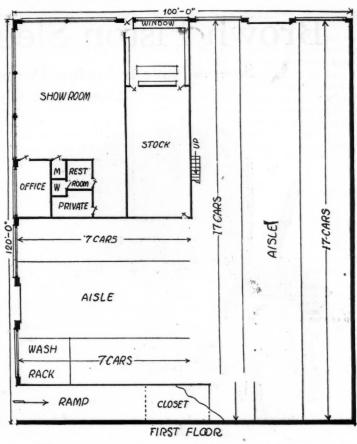
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TWO STORY PLAN

ing busy seasons. If the rear door has no glass in it have it glazed to give still more daylight.

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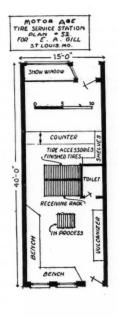
The suggested tire racks are in several tiers, extending to the ceiling if necessary. The upper ones may be used for new tires if they are to be handled. Tubes, etc., will go under the counter and on the shelves.

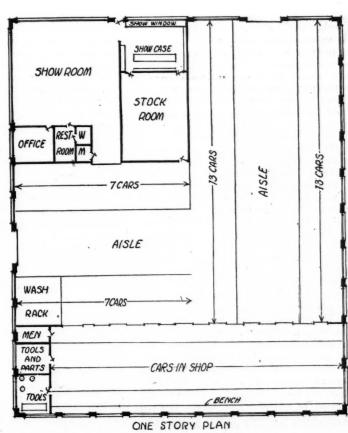
WALTER RESCUES STALLED TRUCKS

Chicago, May 16—Use of road tractors in pulling trucks out of the mud was demonstrated recently by the Mercury Mfg. Co., distributers for the Walter tractor. The site chosen for the display was the new Field Museum, Grant Park. Little difficulty was experienced in moving heavily loaded trucks through mud in which they had become stalled by attaching the cable of the automatic windlass to the truck. The Walter tractor, made in Milwaukee, Wis., has four-wheel drive and four-wheel steer, and is similar in appearance to a motor truck, having a short wheelbase and no body. It has been successful in interurban freight haulage.

PULLET IN PRODUCTION

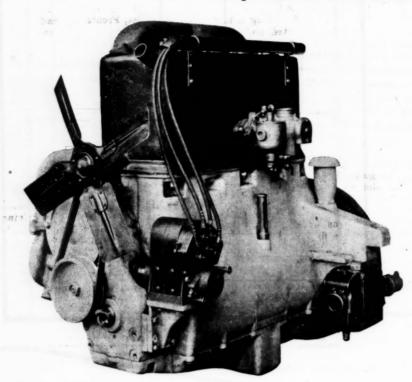
Minneapolis, Minn., May 16—The Pullet Tractor Co. has reached the production stage, and the tractor will make its appearance in the Northwest trade this year. The Pullet is a four-plow machine of priginal design and was shown for the first time at the exposition this year at Minneapolis.





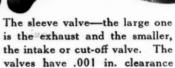
Brown Piston Sleeve Valve Engine

Sleeves Have Individual Bores—Light Weight and Silent Operations Characteristic



Three-quarter view of Brown engine. Each cylinder has two sleeves—one within the other—operating within their own bore on the side of the cylinder. The exhaust manifold is seen at the top. The magneto and water pump are driven from the horizontal cross shaft at the front





GASOLINE engine with a new form of A valve mechanism, in which the valves are operated by a device similar to the Corliss steam engine wrist plate and a modified piston sleeve valve operating on the side of and apart from the pistons, has been developed by the Brown Motors Corp., Rock Island, Ill. Each cylinder has two piston sleeve valves which operate within their own bore, located on the side of their respective cylinder bores. The outer sleeve acts as the exhaust valve, and emits the gas out through the top of the valve chambers, and the inner sleeve acts as a cut-off valve and allows the intake gases to be properly directed. The valve construction, being on the side of the block permits of a very compact design, the four-cylinder engine with a bore and stroke of 4 by 6 in. has an overall block length of 23 in. and the complete engine weighs about 550 lbs. which is considerably less than sleeve engines of like size.

On the downward stroke of the piston the outer valve moves upward, closing the exhaust port and the intake valve travels downward, uncovering the intake port and fresh gas is drawn directly into the cylinder. This gas is always cooler than the valves and acts as an air cooler for them.

Upon the completion of the intake stroke, the inner or cut-off valve moves upward into the narrow annular space in the head of the outer valve and seals the intake, the piston then moves up and compresses the gas. When the charge of gas is compressed to its highest, the spark occurs and while the piston moves downward the peculiar action of the valve gear permits the valves to remain almost stationary and surrounded during this time by water jacketed metal. When the piston has moved downward, the rapid action of the gear opens the valve almost to its maximum opening before the crank has traveled 40 deg.

Valve Operation

The motion of the gear is very positive; its method of operation can be seen in the vertical cross section. The inner or cutoff valve is driven direct f om the eccentric shaft which is driven though an idler gear from the main shaft at half speed. From this eccentric shaft there is driven an auxiliary shaft. This aixiliary shaft does not revolve but has an oscillating motion, this being the action that is transmitted to the outer exhaust valve through the short connecting rod.

The valves themselves are of cast iron, ground to fit the bore to 0.001 in.

The inner valve is the intake, and is ground and fitted to 0.001 in. About half-way up this valve there is east in a dividing wall that forms a directing passage for the intake gases. This valve is fitted with one ring, which serves to keep oil

from working up and not to keep the valve tight, for the mechanical fit is close enough to accomplish this. At the position of cutoff the intake valve slides upward into the passage formed by the exhaust valve and its cap.

The crankcase of the engine is of aluminum and presents an unusual appearance. with its removable side plates and front cross shaft which is inclosed, and projects only enough to attach the magneto on one end and the water pump on the other. This construction further accentuates the compact design of the engine. The bottom portion of the crankcase is removable. This lower part acts as a reservoir for the oil and is fitted with cast in oil sumps for the connecting rods to dip into.

The lubrication of the engine is a combination of splash and force feed. The pump is of the gear type and is driven from the eccentric shaft through a hollow shaft which acts as a conductor for the oil. The oil is led from the pump through its hollow drive shaft to the eccentric shaft. From here the oil is led to the hollow bell crank or wrist plate shaft. Separate oil leads run to the main bearings, and is distributed through annular oil grooves. After the oil leaves the bell crank shaft and the main bearings it is splashed by the connecting rods to the sleeve wrist pins and pistons.

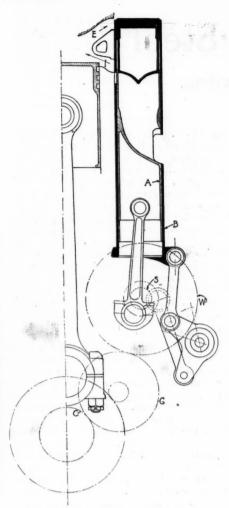
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Operation of Brown annular valve

One peculiar feature of the engine is the method by which the carbureter is attached. If the carbureter is attached to the left side of the engine the gases pass through the block to the external aluminum heating stove and from there is distributed to the valve ports, but if the carbureter is attached to the right side the gases enter directly into the intake sleeve.

Outside of the valve construction and its operating mechanism, the engine presents no new features. The crankshaft has three bearings, each bearing having its adjustment made by the addition or removal of shims. These are matters of detail and since the engine will be a licensed proposition, the manufacturer making it will design his engine around the valve principle, suiting the other details to the equipment and facilities at his disposal.

Walter F. Brown, the designer of the engine, in an attempt to prove his claim that the valves would not stick or bind due to excessive heating, performed this experiment: The oil was drained from one of the engines, and the car driven for several miles until the engine stopped. Then after taking the engine apart it was found that the main bearings and pistons had seized, but the valves were in good condition.

MILTON WINS UNIONTOWN

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(Concluded from page 18)

son; Dalene, Duesenberg, and Gaston Chevrolet, Frontenac. Milton drove a Duesenberg, and Chevrolet and Milton Frontenacs.

From the first lap the fight for first place was among Milton, Mulford and Chevrolet. Chevrolet had the pole and led the pace for four laps, when he gave way to Mulford.

For thirty laps the two cars raced almost neck and neck. Milton, while retaining third position all the while, did not seek to pass the leaders until the race was half over, being content with following a half lap behind. He then spurted and drew alongside the leaders on the forty-ninth lap. He took the lead in the fifty-first and held it until the end. On the fiftieth lap Milton took the lead from Chevrolet but was passed by the Frenchman in the same lap, only to see the Duesenberg again take the lead a lap later.

A badly spent tire prevented Chevrolet from showing his usual speed at the end of the race. At the eighthieth lap his right front showed signs of weakening, but rather than go to the pits and lose his position Chevrolet nursed the weakening tire along. When he started the final lap with Milton already in, the tire blew, but Chevrolet gave no signs of slackening. He pounded around the final turn on the rim and finished a half lap ahead of Mulford. So far were the three leading cars ahead of the field that Mulford was forced to the pits in the eighty-seventh for a tire change,

lost a lap but did not lose his position of third place.

McCarthy, driving a Hudson, went out in the first lap with engine trouble but re-entered the race too late to climb into the money. Boyer followed him around later with a flat tire, re-entering the race a lap behind but throughout the remainder of the contest clung close to the leaders. Gaston Chevrolet, Frontenac, made many trips to the pits for engine treatment. Three cars entered—Simmons, Hudson; Monahan, Johnson; and Howard, Peugeot—did not start.

PROSPECTS FOR INDIANAPOLIS (Concluded from page 18)

and Paul Bablot, who will drive Ballot cars, and Andre Boillot, a brother of Georges Boillot, the famous French racer, who appeared at the May 27, 1914, Indianapolis race and who was shot while serving as an aviation pilot in the war.

Andre Boillot will drive one of the Peugeot cars. He has not had an illustrious career as his brother and his driving was confined to two years on the Brooklands track in England. He has not driven in any of the great French races.

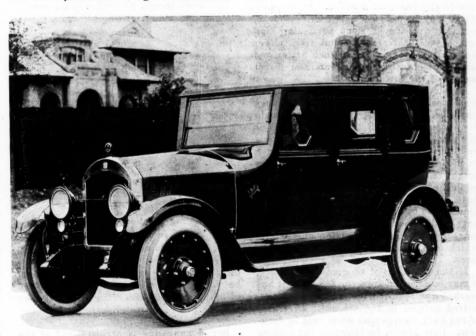
The Ballot cars which Wagner and Bablot will drive arrived on the same steamer. With them came three mechanics.

Cole Adds Sportsedan to Line

A NEW Aero-Eight sportsedan, listed at \$3,895, brought out by the Cole Motor Car Co., Indianapolis, Ind., features solid rear quarter sections provided with octagonal windows to correspond with the beveled glass panel at the rear. From the frame line to the roof, the sides of the car are unbroken by an overhanging of the super-structure, a new flush panel design being introduced to replace the conventional overhanging construction.

The upholstery is in gray and blue mohair velvet, and the fittings are in accord with the general design. Foot pillows are supplied in the tonneau. Corner lights are provided and the dome light arranged to light the interior automatically when the doors are opened. Automatic regulators take care of the temperature for summer and winter driving. A heater is fitted in the floor of the tonneau.

The sportsedan may be had either in Aero-gray or American flag blue, with the solid panels and top in black. Special painting and wire or steel wheels come extra.



Octagonal windows are features of this new Cole Aero-Eight, the sportsedan

Heat Treatment of Steel

Ordinary Shop Practices of Annealing, Hardening and Tempering

THE processes of heat treatment are designed to suit or fit the steel for various uses by changing the size of the grain of the metal, making it stronger or weaker, and by changing the chemical composition of the alloys of the metal to give it certain different physical properties. In ordinary shop practice, heat treatment consists of the following: The process of annealing, the process of hardening and the process of tempering, each of which accomplish a certain definite result.

In each of these processes it is absolutely necessary that the metal to be treated be brought gradually and evenly to a uniform degree of heat throughout the piece being treated, and from this point of heat cooled according to certain directions which correspond to the process selected.

Annealing

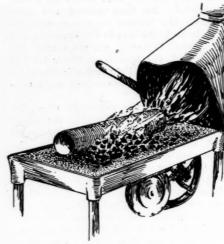
Annealing, or softening, is the process which relieves all internal strains and distortion of the metal and renders it in such condition that it easily may be cut, machined, bent or shaped to any desired form. There are certain cases where annealing is done for no other purpose than to relieve the metal of certain strains, this usually being the case after forging and welding operations have been performed. There are cases when it is desired only to soften metal sufficiently to assure the easy handling of it and in some cases the object is to accomplish both, such as a forging which is to be machined. Regardless of which it is, the procedure is identical.

The steel to be treated must be heated

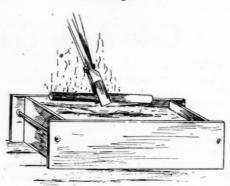
The steel to be treated must be heated to a dull red heat. In this care should be exercised so that every point of the metal reaches the same degree of temperature at practically the same moment. An ordinary forge may be used for this heating, but an oven or furnace of some particular kind which will protect the metal from either hot or cold air currents is much better and also protects the metal from the direct action of the fire.

A very simple oven for the heating of small tools is made from a piece of ordinary gas pipe. In this selection the pipe should be just large enough to admit the tool or the piece of metal to be heated. Close one end of it and place it on the coals until the inside of the pipe has been heated to a bright red. Now place the part to be heated in the pipe and let it come to the desired heat. While this method has somewhat the appearance of a shop-made affair, it serves very well. The metal is protected from air currents and the direct action of the fire, which is the most essential of all precautions.

If the work is not of great importance, it may be removed from the fire when it has reached the required temperature and permitted to cool in the air until all traces of red have disappeared when held in darkness. Care should be taken in the cooling of metal in this way so that it is not affected by cold air currents. When the



Annealing oven made of gas pipe and forge



In testing for the proper heat of steel for hardening, the bar of heated steel should be dark red on one end and almost at white heat on the



In cooling for tempering, insert 1/2 or 3/4-in. in bath and remove before the red heat has left

metal has cooled to the extent that it can be placed in direct contact with a piece of dry pine without causing smoke, it then may be placed in water to finish the cooling.

Better annealing is accomplished if the cooling operation is permitted to extend over several hours. This is done by plac-

ing the work in a bed of non-heat-conducting material such as charred bone, asbestos fiber, ashes, lime, fire clay or sand. The metal should be well covered and allowed to remain, undisturbed, until cool. Another method of gradual cooling may be accomplished by leaving the work in the oven and letting the fire gradually die down. All openings of the furnace or oven should be tightly closed during the operation. Remember that the more time taken for cooling metal from a red heat the better will be the results of the annealing.

Unlike the preceding methods, brass or copper is heated to a low red heat and quickly dropped into cold water.

Hardening

The process of hardening is accomplished by bringing the metal to the proper temperature, slowly and evenly, the same as for annealing, and then cooling more or less rapidly, depending on the grade of the steel being worked upon. The degree of hardening is determined by the grade of steel, the temperature from which it is cooled and the temperature and the kind of cooling bath into which it is plunged for cooling.

Steel to be hardened is placed in the oven and permitted to come to a heat of about 650 or 700 deg. It then is placed into a heating bath of molten lead, fused eyanide of potassium, heated mercury or some other preparation designed for the purpose. The heating bath is kept at a certain temperature by a fire acting upon it or it is heated by some other source which in result is identical. These baths have the advantage of heating the metal evenly and to the desired temperature without danger of overheating or underheating, but in most cases the fumes arising from the bath are poisonous, and if not altogether poisonous they are very disagreeable.

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The degree of heat to which a piece of steel must be brought depends on the percentage of carbon contained within the steel. The more carbon, the lower the heat required to harden.

To determine the temperature of heat from which steel should be cooled a simple test may be made, provided a piece exactly like the material being worked upon, and 5 or 6 in. long, is obtainable. Place one end of this into the furnace and permit it to come to almost a melting heat and be kept at this heat until the other end of it comes to a dark red heat. Now dash it into the water, being careful that both ends strike the water at exactly the same moment. Now each point, from one end to the other, has been cooled at a different temperature. After cooling remove the piece from the water and break it at intervals of about 1/2 in. along its length. Now the point which has reached the proper cooling temperature will show a very fine and smooth grain, and cutting or filing at this point will be found impossible. Of course, it is necessary that the exact color at this point, before having plunged it into the water, be remembered, and whatever color of heat the test spot showed, the metal to be worked upon should be heated to that same color.

It is also very essential that the cooling bath be of the same temperature during

each process of cooling.

Ordinarily, steel is cooled in water, but many other liquids are used. If cooled in strong brine, the heat will be extracted very rapidly and the degree of hardness will be much greater than if cooled in water. If cooled in a bath of mercury, a still greater degree of hardness is obtained, but extreme care should be exercised if mercury is to be used, because the fumes which arise from it are poisonous.

If toughness is wanted without extreme hardness, the metal may be cooled in lard oil, fish oil or neatsfoot oil. If a result is desired which is just half way between the results obtained from water and that of oil a thick layer of oil is placed on top of the water. In this method the steel passes through the oil first, thus avoiding the sudden shock of the cold water but producing a degree of hardness almost as great as if the oil were not used.

Of course, it will be found necessary to make a separate test for each cooling medium used. If the fracture displays a coarse grain at the point of fracture, the steel was too hot at that point, and if it may be filed or cut with a hacksaw, it was not hot

enough.

In the hardening of carbon tool steel it should be brought to a cherry red heat, the exact degree of heat depending on the amount of carbon in the steel and the results of the tests made, then plunged into cold water and held there until all hissing and vibration has ceased. Brine is used for this and is better than water. When the hissing and vibration have stopped it may be removed and placed into oil for complete cooling.

In the case of air-hardening steels or high-speed tool steels the operation is the same as for carbon steel except that after the work has reached a cherry red heat the cutting point must be brought to a white heat, almost melting, and then cooled in an oil bath or current of cold air.

When hardening brass, bronze or copper the work is accomplished by hammering or working while cold.

Tempering

Tempering and hardening often have been classed or thought of as being the same thing, but tempering is the process of making steel tough so it will hold a cutting edge and not crack or cheek. Tempering makes the metal stronger and the grain finer. Tempering may be considered a continuation of the process of hardening in that it generally succeeds the hardening operation.

Heat the metal or tool to be tempered, slowly, to a cherry red heat and then dip into water to a depth of about ½ or ¾ in. above the point. When the piece has cooled to the point where the portion above the water has not lost its redness, remove it from the water and quickly rub the end with a fine emery cloth.

While the heat from the uncooled portion of the metal gradually heats the point again a change of color occurs at the

polished point. When a certain color has been reached the entire tool should be completely immersed in water and permitted to remain there until cold.

Wood saws and springs should be a dark

Cold chisels and screwdrivers should be a dark blue or light purple.

Punches, drills and wood-working tools should be a brown.

Taps and reamers should be an ordinary straw color.

Lathe tools, planer, shaper and slotter tools should be a light straw color.

Colors darker than the dark blue, ranging through green and gray, signify that the piece has reached its ordinary temper, which means it is partially annealed.

After a spring has been properly hardened by dipping in fish-oil or lard it may be held over the fire while still wet with the oil and permitted to catch fire. After the oil burns off the spring has been properly tempered. Self-hardening steel should never be placed in water.

Case hardening is the process of harden-

ing the surface of the steel, leaving the inside strong and tough. More carbon is added to the surface of the steel, which offers good wear-resisting qualities and has the effect of forming a very hard coat on the outside while leaving the inside practically unaffected.

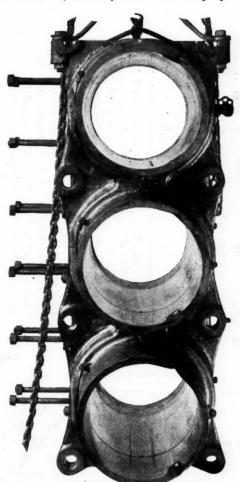
A simple way is to heat the piece to be case-hardened to a red heat and then sprinkle or rub the part of the surface to be hardened with potassium ferrocyanide. Permit the cyanide to fuse on the surface of the metal and then dip in brine, mercury or water. To repeat this operation renders the surface harder and deeper each time. Great care should be exercised in the use of potassium ferrocyanide, as it is a deadly poison.

Another way is in placing the piece to be case-hardened in a bed of powdered bone and then holding the metal and powdered bone in an iron tray. The tray contains the powdered bone and the work now is heated to a bright red heat for half an hour. Remove the work and plunge it into brine or water.

Repairs Cylinders in Short Order

L. Lawrence Process Inexpensive

A N example of business growth resulting from service methods and business efficiency is illustrated in L. Lawrence & Co., Newark, N. J. This company



Some scored cylinders such as are repaired by the Lawrence process

makes a specialty of repairing scored cylinders and cracked waterjackets, by a patented process, which welds electrically into the scored portions an alloy of silver and nickel, and then grinding this added material smooth with the rest of the bore.

Because of the rapidity and accuracy with which this work can be done, service station men are assured 24-hr. service on all engine blocks sent into any station controlled by this company. The cost of doing a job with this process is about a tenth of that for a reboring job. One of the big advantages of this method over others is seen when the process is applied to a block with a cracked waterjacket. Ordinarily this problem is met by preheating the block before welding the crack together. This very often causes warping. With the Lawrence process, the block is kept cool and the cracked portion is fused together with this alloy of silver and

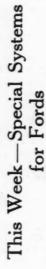
The company's original plant at Newark, N. J., has been supplemented with plants in Chicago, New York, Detroit, Milwaukee, Wis.; Cincinnati, Ohio; Kansas City, Mo.; Philadelphia, Pa.; Los Angeles, Cal.; and San Francisco, Cal. Other plants are

being contemplated.

The economy of the process is the appealing feature to the car owner, as it enables the same pistons and piston rings to be used. This was the principal reason for establishing the Milwaukee office, as it enabled engine manufacturers to have blocks fixed up that would otherwise have to be re-ground or else scraped, either alternative being costly. The company guarantees its welding work for the life of the engine, which is rather a long guarantee. It has repaired more than 50,000 engine blocks within the last few years.

It is one of the modern processes by which not only the car owner has been able to save money, but the foundries as well, in reclaiming defective castings.

Motor Age Wiring Diagram Chart No. 29



Chevrolet-Nov. 28-March Buick-Nov. 21-April 3 Cole-Jan 23-April 3 Abbott-March 20-27 Apperson-March 6 Chalmers-Feb. 20 Chandler-April 3 Cartercar-May 1 Cadillac-Dec. 9 Alter-Nov. 14 Alco-April 24 Case-Feb. 27

STEERING COL. BOLT

DASH

GRD(S)

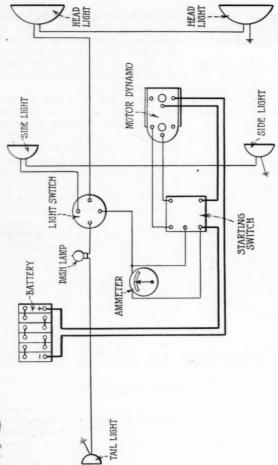
Grant-Feb. 27-March 27 Hudson-Dec. 5-May 1 Interstate-March 13 Hupmobile-Feb. 13 Henderson-April 3 Detroiter-March 6 Empire-March 13 Dort-March 13 Dodge-Dec. 12 Davis-May 8 Elgin-Feb. 27 Ford-Jan. 30

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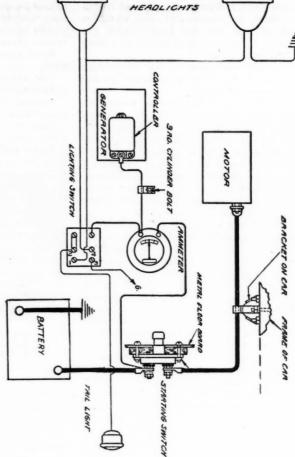
Locomobile-Jan. 23-April Lexington-April 24 Marion-March 6-20 Maxwell-Jan. 16 Little-March 20 Mercer-Jan. 23

Stearns-Knight-April 24 Scripps-Booth-Dec. 26 Regal-Feb. 6-April 10 Michigan-March 20 Overland-Nov. 7-14 Oldsmobile-Jan. 23 Studebaker-Dec. 26 Pullman-April 10 Premier-April 10 Simplex-April 17 Mitchell-Jan. 9 Oakland-Jan. 2 Murray-May 1 Saxon-April 17 Reo-Feb. 27

SPECIAL SYSTEMS FOR FORDS—May 15

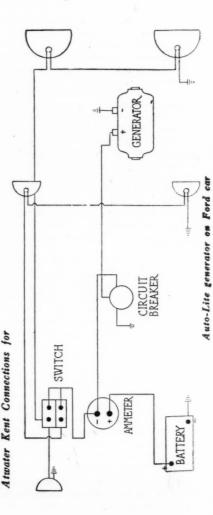


Fisher starting and lighting system on Fords



A. B. C. starting and lighting system for Fords

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The Readers' Clearing House Ouestions and Answers

Conducted by B. M. Ikert

Clutches, Transmissions and Axles

Hele-Shaw Clutch Explained

E XPLAIN with the aid of illustrations the Hele-Shaw hydraulic transmission.—Dodge Freeman, Binger, Okla.

This transmission consists of a five-cylinder pump located directly behind the flywheel which pumps oil into two motors, one in each rear wheel. The pump is connected direct to the engine and the motors are integral with the wheels. Variations of ratio of speed between the engine and drive wheels are effected by a variable stroke arrangement of the piston linkage. This principle in application consists of a series of radial cylinders with pistons, secured to and revolving with the driving These pistons are fitted with wrist shaft. pins which, instead of being jointed to the usual connecting rod, are pivoted to slippers disposed within an annular guide ring. This guide ring encircles all of the slippers and runs within a ball bearing.

It is floating and adapted to be moved out of concentricity with the shaft upon which the cylinders are secured and with which they rotate. The effect of thus moving the guide ring is to vary the stroke of the pistons from nil to a certain limit and to reverse the direction of their reciprocation at a given time. All the cylinders communicate at their inner ends with ports disposed within a stationary distributor shaft. This shaft is provided with passages through which the intake and discharge of the fluid which constitutes the operating medium flows. The action of the pump, Fig. 3, is as follows: D in the figure represents the distributor shaft with passages P1 and P2 for the intake and discharge of the fluid.

At the inner portion of each cylinder is a port which registers successively with P1 and P2 on opposite portions of its annular path. To the wrist pins W are pivoted the slippers S; these slippers bear constantly on the inner surface of the guide ring G, which revolves on ball bearings B. This guide ring when in the central position, B of Fig. 1, brings all of the slippers equal distances from their axes so no reciprocation of the pistons is caused by the revolutions of the cylinders. Upon being moved to the right, however, it will be seen that the pistons move outwards when turned to the right and inwards when turned to the left.

The effect of this is to draw the fluid from P1 into the cylinders, discharging it into P2 as they revolve. This is analagous to the action of the transmission pump in forward speed, the guide ring being moved to the left, the direction of fluid flow is reversed, which corresponds to the action of the transmission pump in revers-

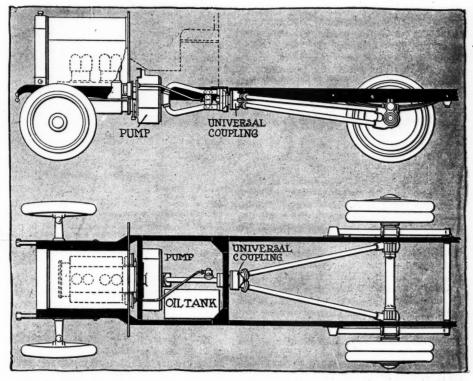


Fig. 1—Shows diagramatic layout of Hele-Shaw transmission. Lubricating oil is used as the medium

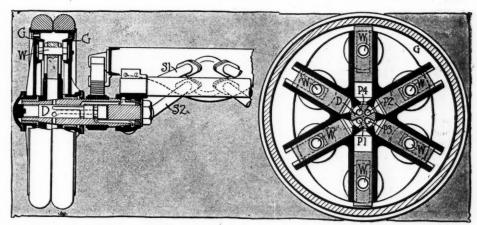


Fig. 2—Illustrates the four-way distribution valve. G is the guide which limits the piston cut-off

ing the vehicle. It will be seen that the stroke of the pistons is governed according to the degree of eccentricity of the guide ring, that is, when moved only a short distance out of center the stroke is short, using a large amount of power to produce a slow rate of fluid flow which corresponds to low gearing, in that the small amount of fluid fed to the motors causes them to revolve more slowly, with the engine moving at a given speed, than when the pump-stroke is long. Thus the reduction between the pump or positive element, and the motors,

or the negative element is increased or decreased by the movement of the guide ring; affording reductions of from, say, 3 to 1, to 1,000 to 1.

The driven elements in each rear wheel operate on the same principle as the pump, except, of course, that the fluid is here used to move the mechanism instead of the mechanism moving the fluid. The differences in construction between the motors and the pump are that the pump uses a stationary guide-ring, and the ball bearing rollers attached to the wrist-pins in-

stead of the slippers used in the pump; and that the guide ring is elliptical instead of circular.

The shape of the guide-ring requires that the rollers be used instead of the slippers, as is apparent. The elliptical form of the guide ring, which is, of course, determined by accurate plotting, and not a true ellipse, causes the pistons to reciprocate twice per revolution, instead of once, as in the pump, thus utilizing twice the amount of fluid that would be used were the ring a circular eccentric. The motors use six cylinders, and four distributor ports. Opposite ports are intercommunicating, the two pairs of ports being separately connected to the two lead pipes. The guide-ring is, of course, stationary, being, in fact, a portion of the motor frame.

Referring to Fig. 2, D is the four-way distributor, W a wrist-pin, with its roller, G the stationary guide-ring, cut in the frame of the motor, P1 and P2 the ports leading to supply pipe S1, and P3 and P4 the ports leading to the supply pipe S2. The fluid used in the Hele-Shaw system of transmission is oil of ordinary lubricating body, a surplus being stored in a tank. The inlet and outlet connections to the pump are lead by two pipes, one above the other, to a distributing valve of special design which distributes the oil to two pairs of pipes, which lead to the two motors in the rear wheels. This distributor valve is in the nature of a double trunk valve, and permits of universal movement of the pipes as caused by spring defection. These pipes act as torsion tubes.

The control is by a single pedal, which fulfills all the functions of clutch, changegear, reverse, and brake controls, by a simple movement of the pump guide-ring. When the pedal is allowed to come all of the way back, full forward speed is obtained, at the minimum speed reduction, or high speed. As it is depressed, the reduction is increased indefinitely until the central position is reached, at which time the guide-ring is concentric with the distributor valve-axle, and the action is neutral. Upon being depressed still more, the guide-ring is thrown out of its concentric position, in the opposite direction from that for forward speed and the car is driven backward. A suitable stop is fitted to retain the pedal in the neutral position. The braking effect is produced by the depression of the pedal, the effect of a given degree of depression varying with the speed of the vehicle, the weight and gradient, and the motor speed.

TO assist readers in obtaining at a unit all information contained in this department on a certain subject MOTOR AGE segregates inquiries into divisions of allied nature. Quesns pertaining to engines are answered un-that heading, and so on.

CLUTCHES, ETC.

Dodge Freeman	Binger, Okla.
Harold Rainwater	. Dayton, Wash.
A. W. Turpin	Molson, Wash.
George Manus	Oakland, Cal.
W. L. Borroughs	Chicago

ENGINES

H. H. Hauger	. Monrovia, Cal.
J. A. Hill	.Adalrville, Ky.
Dewey Mauk	Eakley, Okla.
Howard T. Dimmick	Shreveport, La.
J. J. RBi	rmingham, Ala.
Clyde BravesF	
Howard Hanagan	Columbus, III.
Reader	Pittsburgh, Pa.
John E. GashBat	tle Creek, Mich.
P. E. W	

THE ELECTRIC SYSTEM

Charles Dunlevy	.Oskaloosa, lowa
Harry Grennell	Superior, Wis.
R. E. Hooper	Lincoln, Mont.
Louis Aucoin	Napoleonville, La
R. D. Hanson	Pittsburgh, Pa.
Reader	St. Louis, Mo.

MISCELLANEOUS

George Manes	١.		 	 								.Oakland, Cal
												Clovis, N. M
W. H. Hall								 				Stockton, Cal
Louis Perkins						. ,				,		Zell, S. D.

No communication without the writer's name and address will be answered in these

A shade past neutral will always lock the wheels, when moving forward. This control eliminates the gear lever and the brake pedal, a friction brake being operated by a side lever for emergency and as a standing brake.

This system has been demonstrated, as applied to a 3-ton truck chassis, with gratifying results. Pressure gages were fitted to show the pressures on the suction and compression sides of the pump, and the mechanical efficiency shown for the motor thereby, reached as high as 95 per cent, is the report. The normal pressure shown in ordinary operation was 225 lbs., while the maximum was 600 lbs. It was found to be noiseless, with the exception of a slight pounding of the oil in the motor when the speed was suddenly accelerated or retarded. This defect, however, is now being overcome by the inventor, it is said.

Power Gear Shifts

Q—How many makes of gear-shifting machines are there made, ones that will shift gears when the clutch is thrown out?

2—Are they practical?

3—What are their worst faults?

-What kinds of power do they use? -Where are they made?

6—Do you know of an engine driven tire pump that will throw itself in and out of gear? I want an engine driven tire pump that will keep up pressure in a small tank that would be mounted on an auto, wanting pump to pump the pressure up to 80 pounds after it has fallen to 60 pounds, at times some air would be used out of the tank. I would want the pump to be self-acting, that the pump would throw itself in and out of gear. The kind of pump that I mean is a pump that is individual on each engine such as the Kellogg engine driven tire pump, I do not mean a garage tire pump, but a small individual pump on the engine.—Harold Rainwater, Dayton, Wash.

1-Two that are well known.

2-Yes.

3-In one case, that of the electric, ordinary ignition disorders may upset its workings. But this need not apply if connections are kept in order and the battery is maintained as it should be. Besides, if it fails to work there is a hand shift lever that can be used and which is carried in the car. The hydraulic shift could become inoperative if there happened to be a leak at any of the joints or the tank pressure went down.

4-Electric and hydraulic.

5-One is made by the Cutler-Hammer Electric Company, Milwaukee, and the other, the Laurson hydraulic gear shift, made by the United States Gear Shift Co., Eau Claire, Wis.

6-We are not aware of such a pump; that is, to be mounted on a car. Of course, there are compressor outfits that are so equipped.

Clutch Action Explained

Q—The clutch on this 1917 Dodge Brothers car slips. I tightened the tension on the spring and put on new linings and found it held but cannot understand why. Explain.—A. W. Turpin, Molson, Wash.

Perhaps you do not understand the action of the clutch. The plates in the clutch are connected alternately with the engine and the driveshaft, that is, the first plate of the group is connected to the flywheel, and the plate next to this one is connected to the driveshaft. So it is with the whole series. Every plate, which is connected to the engine, has interposed between it and its neighbor a plate connected to the propeller shaft. If there is no compression on these plates, there will be no friction and the engine plates will revolve and allow the driveshaft plates to remain stationary. If the compression on these plates is increased, the friction increases and the dragging force between the plates increases, with the result that the power of the engine is transmitted to the wheels. If the facing on the clutch plates is worn to

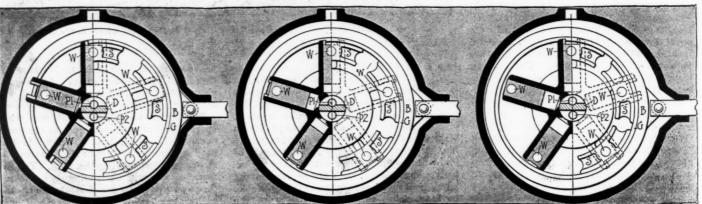


Fig. 3-D is the distributer shaft. Oil flows from P1 into the piston and later is discharged through the passage P2

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Q-shock 2-rolet race get-a gears slipp a qui 1forw a sh

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miss a hig torqu This the b by t the extent that it will not allow the plates to touch each other, then it can be seen that no driving force will be transmitted.

Comparative Tractor Effort

Q—Which will take the most power, to load 1000 lb. on a car or 1000 lb. on a trailer? A says that it takes less power to pull the 1000 lb. on a trailer, B says more. Which is right?—George Manus, Oakland, Cal.

It will take more power to haul a trailer loaded with a 1000 pounds than for the truck to operate itself with a 1000 pound load. The friction on the bearings of the wheels of the truck does not increase very much if the load is increased a great deal and if the truck is running on a smooth road the wheel friction does not increase to any great extent. Opposed to these conditions we have those of the trailer in which there are added four more wheels each with its own friction, both bearings and road friction. Another way to illustrate this is to pull a block of wood over a smooth surface and measure the pull with a spring balance. Then connect another identical block to the first one by means of a flexible cord. Now if a spring balance is used to measure the pull required for the two blocks it will be found that the pull is two times that which was required for the single block. This analogy is applicable to the truck and the trailer.

Gear Ratio on Ford

Q—What is the ratio of the rear axle of a Ford touring car to the r.p.m. of the engine when the car is running 20 m.p.h.?—W. L. Borroughs, Chicago.

The standard Ford ratio is 3.64 to 1 and this will be the ratio of the car if going 5 m.p.h. or 20 m.p.h. and running in high gear. This ratio is naturally a constant one for the number of teeth in the ring gear divided by the number of teeth in the pinion is always the same for the same car.

Engines

Packard Vibration Damper

Q—Explain and show a cut of the vibration shock absorber in the new Packard models.

2—What engines were used in the two Chevrolet racing cars in the last Santa Monica road

3—Does the Owen-Magnetic have as quick a get-away as any car of its class which uses a gearset? It would appear that even though the slippage is used to generate current for a booster. there would still be a certain amount of slip on a quick get-away.—H. H. Hauger, Monrovia, Cal.

1-The vibration damper that is on the forward end of the Packard crankshaft is a shock absorber. It is the purpose of this damper to absorb the torsional vibration of the shaft. No matter how heavy or strong a crankshaft is made there will always be a slight periodic vibration. The longer the shaft the greater the tendency to vibrate and it is this tendency that the vibration damper on the Packard, shown in Fig. 5, overcomes.

2—The engines that were used in the Chevrolet racing cars were designed by Louis Chevrolet.

3-It is the purpose of the Entz transmission of the Owen-Magnetic to transform a high engine speed at a comparatively low torque to a low speed at a very high torque. This gives a very quick get-away. Probably the biggest advantage in get-away is gained by the Entz transmission because there

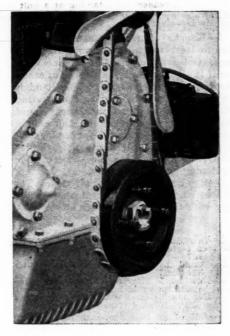


Fig. 5-Vibration damper on forward end of Packard crankshaft

is no lost time in changing from one speed to another.

Mark on Ford Piston Rings

Q—Publish the difference in piston rings. Is there a top and bottom on Ford rings?—Please explain.—J. A. Hill, Adairville, Ky.

We are always glad to publish data of authoritative tests, made under the sanction and supervision of the A. A. A. or some similar organization, but we do not back up manufacturers' claims. Some piston rings claim certain advantages over others, but all have the same office to perform, that of maintaining compression, and if the ring does this and is constructed properly, then it will keep oil out of the combustion chamber.

Ford rings have a top and bottom side, the top diameter being smaller than the bottom. The top of the ring is marked with a small cross. The reason for having the ring smaller on the top than on the bottom is to give a scraping effect that will remove the oil on the down stroke of the piston but will not carry oil up on the up

End Play in Overland

Q—How can shaft in my Eakly, Okla. -How can I take up end-play in the crank-in my Overland 75-B?—Dewey Mauk,

When end-play in the crankshaft of an Overland engine occurs it is best to renew the bearing which causes the trouble. A semi-permanent repair can be made by hammering the metal of the bearing. This. lengthens it slightly and takes up the small distance which causes the play.

Engine Vibration

Q—Describe the powerplant of the Vernon eight and name standard units used on this car.

2—Show cut of the engine.

3—How are piston displacements figured? Piston areas?

4—Show process bore 3.5 by 5, 6 cylinders.

5—At high speeds a small six or eight has less vibration and noise than a small four. Is this due to the more constant application of power in the six or eight, or does the four only seem to be noisier on account of the longer intervals between power strokes?

6—Is there an advantage in placing the exhaust manifold directly over and against the intake manifold, with the carbureter close to the exhaust?

7—Does this mean better fuel economy in cold weather?—Howard T. Dimmick, Shreveport, La.

1-See passenger car specification tables, published first week each month.

2-We have no cut of this engine.

3-Piston displacements are figured by calculating the swept over volume of all the pistons, using the following formula:

 $D^2 \times .7854 \times S \times N$ where D is the bore in inches S is the stroke in inches

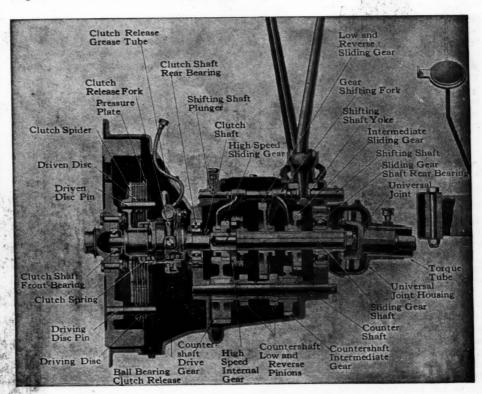


Fig. 6-Clutch and gearset assembly on Dodge Brothers car

N is the number of cylinders.

4-Applying this to your case, we have 3.52×.7854×5×6 or 289.1 cu. in.

5-A four cylinder engine of the kind used in motor cars has an inherent vibration characteristic that is always present, while sixes do not have this. The vibration of a four is composed of a number of vibrations that are present in harmonic form and whose periods are multiples of crankshaft speeds, beginning with two times and ending at an infinite number of times. Thus, the first component of this vibration occurs at twice crank speed and the remaining components occur at odd multiples of crankspeeds but with diminishing force until at infinity the period is infinite in number, but infinitesimal in

6-There is this advantage that in cold weather the mixture is more completely vaporized, but in summer this advantage is not so great, because the volumetric efficiency of the engine is reduced.

7-Yes.

Wants Engine Illustrations

Q-Publish end view of Liberty aviation engine and also a sectional view, if possible, of the Waukesha tractor engine, showing the system of oiling.—J. J. R., Birmingham, Ala.

These are shown in Fig. 7.

Maxwell Has Ringing Knock

Q—Since replacing the old carbureter on my 1917 Maxwell 25 with a Schebler model L the engine has developed a knock. I then tightened all bearings but it still has a ringing knock as though it may be a wristpin loose.

2—Would a warm air pipe from the exhaust

or stove as some call it be of any help to this carbureter?—Clyde Graves, Ft. Worth, Tex.

1-Knocks of ringing nature may be due to loose wristpins or cam shaft bearings. Observe the period of the knock and see if it occurs at cam shaft speed or crankshaft speed. If the former, then it might be end play or worn tubular cam bearing. If the noise occurs at crankshaft speed, then it is a loose wrist pin, and can be eliminated by shorting the spark plugs one at a time. This will locate the cylinder, then it is a case of a new wrist pin or tightening up on the old one.

2-By all means use a hot air stove. The present fuel can be burned successfully only with the aid of a hot air stove.

Piston Clearance

Q—In fitting new pistons after the cylinder has been reground how much clearance should they have?

2—Should the top of the piston be smaller than the bottom?

3—How much clearance should the valve stems have in the guides?

4—How much clearance between tappets and valve stems?—Howard Hanagan, Columbus, Ill.

1-.001 of an inch for each in diameter

is a good rule to follow for piston clearance. -Some people prefer to make the piston slightly smaller at the top than at the bot-

tom because of the increased heat. When this is done the clearance should be in a series of steps as follows: .006 in. between the top of the piston and the first ring, .004 between the second ring and the first, and the remainder should be .001 for each inch of diameter.

3-About .001 in. clearance will do here. The guide is rather long compared to the lift of the valve and there is very little heat reaching the stem of the valve.

4-This depends on the type of engine. For your Hupmobile about .003 in. will do.

Chevrolet Engine Carbonizes

Q—I have installed McQuay Norris Leak Proof rings on my Chevrolet 490-1917 and seem to have a tight piston as no smoke emanates from exhaust after driving a few minutes, yet there seems to be considerable carbon. Where does this come from, considering that carbureter has not been changed and averages 20 m.p.g.?

2—What causes scored walls, and how are they detected?—Reader, Pittsburgh, Pa.

1-Smoke is not the surest and safest indication of oil pumping. A slight score mark will carbonize a cylinder and there will be no excessive smoking. The fact that you are averaging 20 m.p.g. shows the combustion within the cylinder is rather good, and the hard rock carbon formed from excessive gasoline is not your trouble.

2-Scored walls are caused by imperfeet combustion, forming this hard rock carbon from excessive gasoline, caused by loose wrist pins scraping the walls, caused by broken rings, by cylinder wall granulation due to excessive heat from insufficient lubrication, sometimes by imperfeet spark plugs popping and the hard porcelain lodging in between the piston and the wall, also by the dust of the road which is drawn through the carbureter. Score marks can easily be seen when the

pistons are removed.

Changing Tappets on Buick

Q-Is the camshaft design of an engine using e flat or mushroom valve lifter the same as

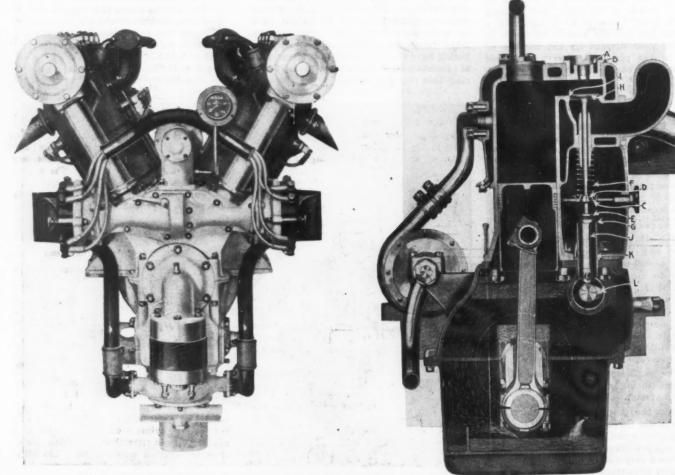


Fig. 7—End view of Liberty aviation engine, left, and sectional view of Waukesha tractor engine, showing method of oiling

those in the engines that use the roller lifter?

2—Does the flat valve lifter run directly over the cam, or is it slightly offset? If so, how much to give the lifter the revolving movement in its guide?

3—If the reply to the first question is in the affirmative can the flat lifter be substituted for a Buick model D-45, and those used in what other car would be best adapted for substitution? It is the intention to bore out the present guides and fit on the top of them dust caps and oil retainers, and use the flat lifters in these guides. This, however, is only a tentative proposal, and any suggestion along the line which you have to offer will be considered before finally deciding.

4—In case the change mentioned in question three should be made will it in your opinion make the car more quiet, and will they be more durable than the present style of valve lifter in these cars?—John E. Gash, Battle Creek, Mich.

Mich.

1—Yes, there is a difference in the mushroom tappet camshaft and the roller tappet camshaft.

2-Mushroom tappets are offset slightly to give an even wearing action.

3-We do not advise the change unless a new camshaft is used, and this will necessitate reboring the tappet guides concentric and centered with the lobe of the cams, necessitating further that special tappets be made.

4-Why not fit the present set of tappets with dust caps and oil retainers, also springs to hold the push rod down against the tappet as in the new Buick models?

Lapping in Pistons

Q—If one wanted to fit an engine with pistons slightly oversize could I not use two or three of the oversize pistons with the proper abrasive to grind or lap out the cylinders with? And then fit the cylinders with pistons the same size I lap with only new ones and do a pretty fair job? That is, cylinders that were only slightly worn.—P. E. W., Temple, Tex.

Yes, this method will do, but micrometers offer a more accurate solution of the job.

The Electric System

Reversing Bosch Rotation

Q—Explain and illustrate procedure for changing a Bosch magneto from left-hand rotation to right-hand rotation.—Glenn W. Madere, Reserve, La. Q—Can a Bosch magneto be changed from left-hand to right-hand rotation? Illustrate and explain.—Charles Dunlevy, Oskaloosa, Iowa.

You can make the change from anticlockwise to clockwise by putting on a complete contact breaker assembly for right-hand magneto. Also the segments or

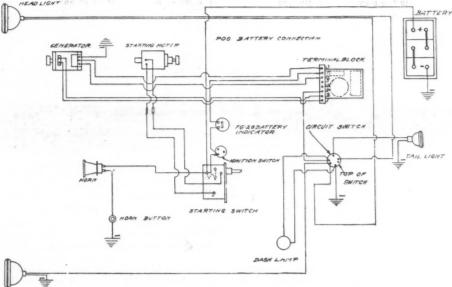


Fig. 9-Electric system used on the Regal. It is the Rushmore make

cams will have to be changed, as you mention. To complete the job it is necessary to remesh the gear on the rear of the armature and distributer gear wheel so the break occurs with the armature in the position shown in Fig. 10. The distance should be

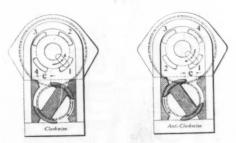


Fig. 10-Changing Bosch magneto rotation

from 14 to 17 mm. The illustration is made viewing the magneto from the driving end. The distributer gear will rotate in an opposite direction from what it did before the change, hence the wires going to the plugs

must be interchanged so the cylinders will

The numbers, 1, 2, 3 and 4 do not represent the firing order of the engine but the order in which the carbon distributer brush makes contact with the metal segments, according to whether the magneto is running clockwise or anti-clockwise.

No Ammeter on White

Q—Publish complete starting and lighting diagram of Model G. F. 1916 or 1917 White car, showing how to cut in an ammeter, to show charge and discharge. I should also like to change head lights so that one will burn independent of the other.—Harry Grennell, Superior,

1-The diagram for the White car is shown in Fig. 8. It is not recommended that an ammeter be connected to this system, because it will register discharge only or if an ammeter of 400 amp. capacity be used the discharge current can be measured. An ammeter of this size would be of little value because the ordinary discharge rate is but a few amperes, but in order to accommodate the extremely high discharge during the starting period it is necessary to use a meter of this kind. The system will not permit of one ammeter to perform the dual function of measuring both discharge and charge, unless a special meter is used.

Remy Magneto Diagram

Q-Publish wiring diagram of Remy Model

Q—Publish wiring diagram of Remy Model.

RL magneto.

2—Is there a wire soldered to the rivet that holds the condenser bracket to the magneto?

3—Can this magneto be used on a single-cylinder engine? How?

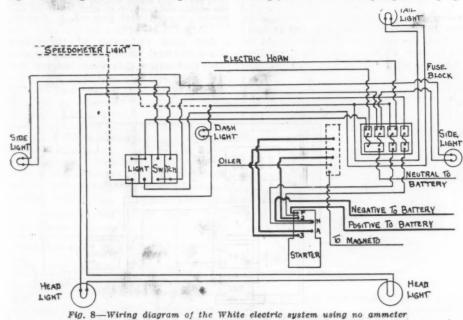
4—Show diagram as wired to auto engine.—

R. E. Hooper, Lincoln, Mont.

1-The diagram for this system is shown in Fig. 11.

2-The wire that is soldered to the condenser bracket is a ground wire as the illustration shows.

3-It is possible to use this magneto on a single cylinder engine, but it is not recommended. It can be driven in the same manner for the single cylinder engine as for the four-cylinder engine and all that is necessary is to time the spark with one of the high tension wires, leaving the other three blank. This means that for every spark that occurs at the spark plug ter-



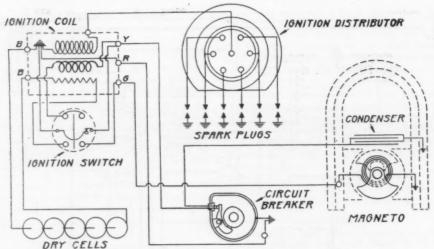


Fig. 11-Wiring diagram of the Remy ignition system using model RL magneto

minal there will be three sparks jumping across the safety gap of the magneto. This causes somewhat of a strain on the winding and for this reason there is a possibility of harming the coil.

4-The illustration for question 1 shows

Gravity of Battery Cells

Q-What strength of gravity should be used in a new bone dry Willard battery, and at what rate should it be charged?

2-Where can I get a good book on the repairing of batteries?-Louis Aucoin, Thibaut Motor Co., Napoleonville, La.

1-If the plates in this bone-day battery are new then electrolyte whose specific gravity is about 0.1220 to 0.1250 can be used. If the battery has been overhauled and new electrolyte is to be used then see that its specific gravity is about 0.1280 to

2-Storage Battery Engineering Simplified, by Victor W. Page, published by the Norman W. Hanley Company, New York, and Storage Battery Engineering by Lyndon, published by McGraw-Hill, New York, are two very good books for the storage battery repairman to have.

Wants Regal Wiring

Q—Publish instructions and wiring diagram of Rushmore generator and starter system of Regal car.

2—Why does the cutout stick and burn out?

R. D. Hanson, Pittsburgh, Pa.

1—The diagram of the electrical connections of the property of the

tons for the Regal car is shown in Fig. 9.

2-It is rather difficult to state the exact reason for the inoperative condition of the cutout on your car. There are a possible one hundred or more reasons why the cutout will not work. Your letter does not

Wiring on 1914 Case

Q-Publish wiring diagram of the 1914 Case. Reader, St. Louis, Mo. The diagram is shown in Fig. 13.

Miscellaneous

Carbureter on Overland

Q—What is the best type of carbureter to use on an Overland engine Model 83. I had a model 69 and changed engines and kept the carbureter which is a model L Shebler. I got from 17 to 20 m. p. g. I have been told that the Schebler carbureter is not proper for this engine. The engine is in the best condition, has lots of power but is too strong on gasoline.

2—What adjustments are there, and how would you adjust a Tillotson carbureter same as is used on the late models Overland?—George Manes, Oakland, Cal.

1-There is no reason why the Schebler carbureter will not work on your car. We believe that your mileage is a little better than you ought to expect, and further believe that the carbureter fits the engine to perfection.

2-There are but two adjustments on this carbureter. First the needle valve (B) shown in illustration Fig. 12. This needle

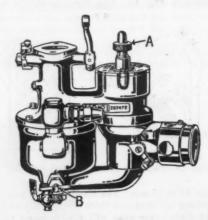


Fig. 12-Tillotson carbureter, showing adjustments

valve should be from one and one-half to one and three-quarters turns off its seat. Second, the auxiliary air valve should be on its seat which is the normal position when the engine is at rest. To get this position, turn out (A) to the left until point is reached where, when lifting or pulling up on (A), the auxiliary air valve, a decided click is heard (this is the valve coming in contact with the seat). Then turn (A) to the right, or down, notch by notch, until click is no longer obtained when lifting the nut (A) as directed above. The air valve adjustment is secured by the nut (A). The stem of this nut supports the lower end of a spring which controls the air valve. This air valve opens downward into the air chamber. Turning the nut (A) to the right or down tightens this spring, increasing its tension, causing less air to be admitted, thus producing a richer mixture. Turning (A) in the opposite direction, or to the left produces a leaner mixture. After the engine is warm, retard the spark and set the throttle to a position on the quadrant which will correspond to about 25 m. p. h. Then turn the needle (B) either way as necessary to give the best engine speed. This should also correspond with the best idle and high speed adjustments. If it is found that the mixture is too rich at speed of ten to fifteen miles per hour on level roads, causing the engine to miss or jerk, the carbureter performs in a satisfactory manner in all other respects, the air valve (A) may be turned up or to the left one or two notches. It should not be necessary to change (A) more than two notches either way if carbureter is set as above directed, nor to change the needle adjustment more than one-quarter turn. If a mixture is too thin to run on idle, there is an air leak somewhere in the intake manifold between the throttle and engine, which should be located and stopped. To start the engine, pull on dash control on the instrument board to its highest position. Immediately after the engine is started the control must be pushed down one-third open in order to prevent the engine from choking. Gradually lower it the rest of the way as the engine warms up and be sure that it is in its lowest position and that the engine is thoroughly warm before adjusting the carbureter.

Carbureter on Dort

Q-What carbureter will work best on the Dort car? The model number is destroyed, but the engine number is D.U. 6551. The old carbureter does not work good.—J. P. Scantlin, Clovis, N. M.

Any good carbureter of the proper size should work satisfactorily on your Dort car. Carbureters that were designed five

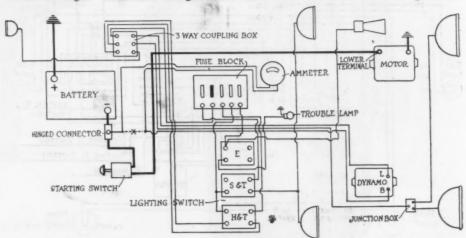


Fig. 13-Wiring diagram of the electric system used on the 1914 Case

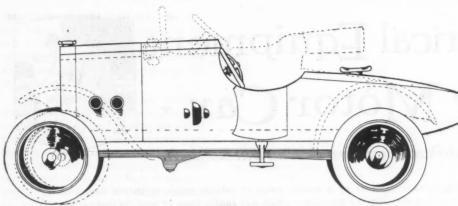


Fig. 14-A suggestion for racing body on Ford chassis. The tank is in the rear

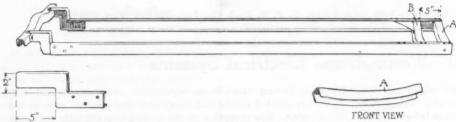


Fig. 15—A suggested scheme for lowering the frame of a Ford by means of brackets and crosspiece

and six years ago might be called old-fashioned for they were never supposed to be called upon to handle fuel like we now use. If we are going to use a new carbureter be sure to get a late model.

How Reader Lowers Ford

Editor MOTOR AGE-I am giving the readers a hint as to lowering the Ford frame for racers: Using an Overland 90 front axle and spindle bolts. Cut off Overland spring perches to make a smooth job and then cut off Ford front spring perches and leave about 1 in. long. Now take main leaf of front spring and assemble perches and shackles and center your holes on Overland axle the same distance as Ford. Drill in outer one, and on top, then weld the Ford spring perch in to the soles and you have a job that will last forever. Now take the Ford regular spindle and cut off upper half, bushing the same and press in the lower half of spindle. Use new Ford bushing on top, then ream out to fit Overland spindle bolt. The spindle will be near the top of the spindle body and be as strong if not stronger than before and you will have some protection for crankcase, for they will be the same height as the front axle and will look 100 per cent better. Cross tube will be 1 in. above radius rod then. Then take a tubular radius rod support and make new ones and mount bracket on top of radius rod and make the pipe long enough, flatter on front ends. Make hole to fit on top of spindle bolts and make a short bit at back end so as not to strike crankcase and you have something to rely on.-Louis Perkins, Zell, S. D.

Wants to Build Ford Racer

Q—I desire to remodel my 1916 Ford. Publish sketch of a neat raceabout body.

2—Advise as to the best way to lower the body.

3—I expect to install light-weight pistons. What kind of pistons would you suggest?
4—I expect to change the gear ratio to 3 to 1.
5—Should I get a different ignition system, or

6-I want to put on a worm steering outfit

and Houk wire wheels and a narrow honeycomb radiator. Where could I get a radiator, or would it be better to have local man make it?

7-I have another 1916 Ford that will be just the same, only I want a three-passenger clover-leaf body.

8-How can I lengthen wheelbase?

9-Where can I get such parts?-W. H. Hall, Stockton, Cal.

1—In Fig. 14 is shown a suggestion for converting a Ford into a racing car.

2—A good scheme for doing this was shown in the Feb. 27 issue of Motor Age, but in Fig. 15 we show another way in which this can be done, but in this case the full elliptic springs would not be so good for fast work. The frame was swept up in the rear so that it was lowered 7 in in the center. Brackets were fitted to the front and full elliptic springs used. The

front cross member was taken out and a flat one put in its place. A Maxwell front axle took the place of the Ford axle and cranked 4 in. to bring the wheel center in line with the frame. More road clearance was secured by cutting off the transmission case oil drain and welding on a new one. This remodelling was done by a MOTOR AGE reader in California.

3—Either the lightweight cast iron or aluminum alloy pistons will give you good results, but in any case make sure that the work of fitting them is done by a good mechanic. Cylinder work and piston fitting on cars intended for fast work is a delicate job and requires more apparatus than most shops have at their command. If you can get an old Ford block, you can have it reground to true up the bores and oversized pistons and rings fitted. An old block is seasoned and there is little danger of warping.

4—Your gear ratio is all right for road work. If you want a fast job for the track, you can use a 2¾ to 1 ratio.

5—If you want to do considerable racing or want a fast car generally, we believe you will be better off to replace the vibrator system of ignition on the Ford with either a magneto or battery system. There is too much lag in the spark of the vibrator system and you probably have noticed that all the successful Ford racing jobs have replaced this system with other types.

6—High radiators like you desire are made by the National Can Co., Detroit; Detroit Radiator & Specialty Co., Detroit; Wright Cooler & Hood, 4868 North Clark St., Chicago; Laurel Motors Corp., Anderson, Ind., and Craig-Hunt, Inc., Indianapolis, Ind.

7-8-9—To lengthen the wheelbase of any car is quite a job, for not only must the frame be extended, but the drive shaft and housing, brake rods, etc. In your case we think time and money would be saved by fitting the device to extend the Ford chassis made by Hayes & Diefenderfer Co., Inc., New York City.

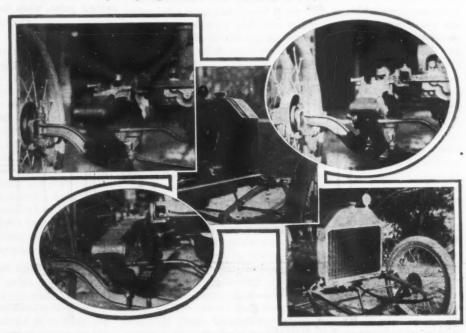


Fig. 16—How Ford rebuilder lowers the frame suspension. Full elliptic springs and a cranked axle are used



Electrical Equipment of the Motor Car -



By David Penn Moreton & Darwin & Hatch.

Editor's Note—Herewith is presented the 147th installment of a weekly series of articles begun in Motor Age, issue of June 29, 1916, designed to give the repairman and motorist the knowledge which will enable them to care for and repair any and all of the electrical features of the car, no matter what make or model it may be.

The first half of this series has been published in book form by the U. P. C. Book Co., Inc., 243-249 West Thirty-ninth street, New York, and is sold at \$2.50. The remainder of the series will be published as a supplementary volume.

Part CXLVII—Westinghouse Electrical Systems

Two generators with electromagnetic voltage regulation are equipped with Westinghouse vertical ignition units. These two generators have a self-contained and separately-mounted combined cutout and regulator. The one with the regulator and cutout self-contained has three terminals marked — B, I and S, and the one with a separately-mounted regulator and cutout has three terminals marked — A IG and F.

Mechanical and Electromagnetic Regulation

The frames of the generators, with combined mechanical and electromagnetic regulation, are similar in construction to frame

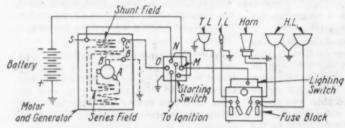


Fig. 716—Wiring of Westinghouse combined generator and motor

No. 760, having third-brush regulation. The cutout and regulator are carried on the end bracket of the machine next to the commutator. The operation of the cutout is practically the same as that of all electromagnetic cutouts having a shunt and series winding.

The regulator has two movable contacts, and the position of one of these contacts is determined by the magnetic force exerted by a solenoid whose winding is connected across the brushes of the generator, while the position of the second contact is determined by a special cam mounted on the shaft of the generator. This second contact is moved up and down as long as the armature of the generator is rotating. Since the first contact is moved up and down by the variation in the magnetic force acting upon it and since this magnetic force depends upon the current in the solenoid, which varies directly as the voltage between the brushes of the generator, it is evident that the duration of the time that the two contacts are in actual contact will depend upon the voltage of the generator.

If the lower contact has not reached the limit of its upward travel when it touches the upper contact, it merely pushes the upper contact upward until it reaches the limit of its upward travel. Hence, the nearer the upper contact point is to the lower contact point, when the lower contact point is in its lowest posi-

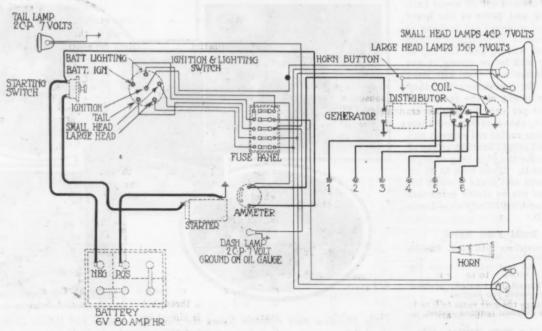


Fig. 717—Wiring diagram of Westinghouse installation on 1917 Chalmers 35A and 35B

tion, the longer the total time the contact points are in actual contact as the cam revolves. On the other hand, if the upper contact be raised, the time the two are in contact is so the cam revolves will be decreased.

While the contact points are touching each other the field current passes directly between them, but when the points are separated the field current must pass through a resistance connecting the contact points and thus decreasing the field current and hence the voltage of the generator. The frames of these machines are designated as No. 761 R.

Generator and Starting Motor Unit

In the combined generator and starting motor unit the generator and starting motor actions are combined, and the voltage of the system is 12 volts with the positive side grounded. The internal connections of a system of this kind are shown in Fig. 272, and the operation of

the system easily may be followed by reference to this figure. The generator is provided with two field windings, one of rather large wire and comparatively few turns and the other one of small wire and a relatively large number of turns.

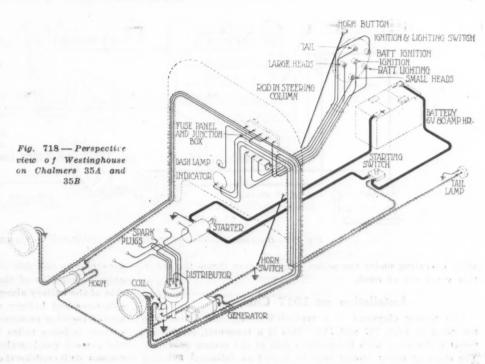
When the starting switch is closed a circuit is completed through the series winding of the machine and its armature, and it operates as a series motor. The regulation of the output of the machine as a generator is by the third-brush method, in combination with the reversed series field.

In some systems using this type of generator the starting and ignition switches are combined and no automatic cutout is used, the combined switch remaining closed as long as the engine is in operation. A system of this kind is shown in Fig. 716, and the electrical unit has two terminals. Other systems using the combined generator and motor unit have an automatic cutout mounted separate from the generator, and in such systems the starting switch and cutout are combined. The generator has only one terminal.

Westinghouse Starting Motors

The electrical operation of the numerous Westinghouse starting motors is practically the same. They are of the series type, and their chief difference is in the mechanical construction of their frames so as to suit them to the different methods of mounting the motors on the engines and the different method of transmitting power from the motor shaft to the engine crankshaft. Two general systems are employed by Westinghouse for connecting the starting motor to the engine crankshaft. In one the engine is driven by a gear, in the majority of cases on the flywheel, that has a sliding pinion meshing with it, which in turn is driven directly or through a reduction gearing by the starting motor and is brought into and out of mesh with the gear on the flywheel by a special shifting lever or some automatic device. In the second system the reduction gears are mounted in the motor housing, and the slow-speed intermediate shaft is connected to the engine crankshaft by an overrunning clutch which prevents the starting motor from being run by the engine.

The intermediate gears connecting the motor to the engine may be brought into mesh by pressing a starting pedal, and after the pedal has moved far enough to throw the gears into mesh the starting switch is closed by a further movement of the starting pedal. Another system makes use of a powerful solenoid in shifting the gears. In this system three switches are used. A push button on the dash is marked start, another switch is mounted in a cylindrical housing through which the starting cable runs and to which there



is a wire from the switch on the dash, and the third is the main starting switch connected to the shifting pinion. Closing the push-button switch on the dash sends current through the solenoid operating the cylindrical switch and causes this switch to close, and the circuit is completed to the large starting switch through a powerful solenoid and to ground. This solenoid pulls on a plunger attached to the sliding gear and main starting switch contacts and connects the motor to the engine and closes the starting motor circuit. The electrical connections are such that when the voltage of the generator is equal to the voltage of the battery there will be no current flowing through the switch windings, which was closed by the dash switch, and this will result in the main starting circuit being opened no matter whether the push-button switch on the dash is opened or remains closed.

A third type of pinion, or gearshift, operates as follows: Closing the main electrically operated switch starts the motor, and it runs at slow speed and then the circuit of the magnetic pinion shift is closed. The operation of the pinion shift disconnects the motor for a brief period, and it revolves due to its own momentum until the gears mesh and then full voltage is applied to the motor. When the starting push-button is released all the various gears and switches are restored to their original condition. In these installations the electrical connections are such that as soon as the engine runs at a speed sufficient to cause the voltage in the generator to be equal to the voltage of the battery, the electrically operated switch opens, even if the driver fails to release the starting-switch button.

A fourth type of automatic screw pinion shift, known as the Bendix drive, is employed. The starting switch may be closed by a foot pedal, or it may be operated electrically by an electromagnet and the circuit of the electromagnet opened and closed by a push-button switch. A fifth and comparatively new method of gear connection between the motor and the engine is one in which the starting motor is connected by gears to the transmission countershaft in place of the engine flywheel or crankshaft. Two spur reduction gears are mounted on a countershaft in such a way that one may be made to mesh with a pinion on the armature shaft of the starting motor, and at the same time the other may be made to mesh with one of the transmission gears. These intermediate gears, together with the shaft upon which they are mounted, are moved back and forth by the starting lever. The electrical circuit through the armature and field windings of the starting motor is closed by the action of the starting lever after it has moved a sufficient amount to cause the gear to be in mesh. No overrunning clutch is required, as the transmission gears

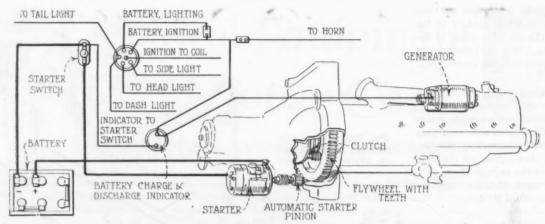


Fig. 719—Diagrammatic view of Westinghouse installation on the Chambers 6-30

when operating under the action of the engine throw the reduction gears out of mesh.

Installation on 1917 Chalmers

Two wiring diagrams of a typical Westinghouse installation are given in Figs. 717 and 718. This is a three-unit, single-wire, 6-volt installation with the positive side of the system grounded. The starting motor circuit may be traced as follows: Starting with the positive side of the battery along the large cable to the grounded terminal of the starting motor, through the starting motor to the starting switch, through the starting switch, when its contacts are closed, to the negative terminal of the battery.

The automatic cutout is located in the generator housing, and the charging circuit may be traced as follows, assuming the cutout is closed: From the negative terminal of the generator through the contacts of the cutout to the ungrounded side of the generator from the ungrounded, or negative, terminal of the generator to one side of the battery indicator, through the indicator to one side of the starting switch, thence to the negative side of the battery along the heavy cable. The positive side of the generator and battery are both grounded; hence, they are connected together permanently and the circuit is complete. If any current is being taken by any one of the various lamp circuits, the current passing through the indicator will be equal to the current delivered by the generator less the current taken by the lamps, ignition apparatus, etc. When the current taken by the lamps, ignition, etc., exceeds in value the current delivered by the generator then the battery discharges and assists the generator and the indicator shows a discharge rather than a charge.

Two bulbs are provided in each headlamp, and the circuit through these bulbs is completed through the ground or frame of the car. The dash- and taillamps are each 7-volt bulbs, and they are connected in parallel and controlled by the same switch. A diagrammatic view of this installation is shown in Fig. 719.

California Gets Model Motor Vehicle Law

Raises Speed Limits and Hits Car Thieves

OS ANGELES, Cal., May 16-Several L drastic changes are made in the revised motor vehicle laws for California which become effective in July. Representatives of all motor trade industries and owners conferred upon the bill before it was enacted and the new law is believed to provide a number of actual improvements. The principal new provisions are:

Increasing the speed limit in daylight on unobstructed portions of highways to 35 miles an hour.

Making it a felony for a person to take a car without the owner's consent and use it with or without the intent to steal.

Requiring new license plates each year. In case of transfer or sale the number must follow the car instead of the owner.

Prohibiting persons under the influence of liquor or habitual users of narcotics from operating motor vehicles.

Prohibiting discharge of firearms from motor vehicles.

Restricting the use of headlights.

Requiring all motor vehicles used for commercial purposes to be equipped with windshields and when the body projects more than 12 in. beyond the driver's seat a rear sight mirror must be used.

Necessitating various arm signals when

To overcome joy riding and the driving of cars by intoxicated persons severe penalties are imposed. A prison sentence of not less than one year or more than five must be imposed upon the joy rider. There is no alternative of a fine. In case of violation of the section relating to liquor and drugs a fine of from \$500 to \$5,000 may be imposed or in lieu thereof imprisonment in the county jail for not less than six months nor more than one year or in state prison for not less than one year nor more than three.

The new signaling section provides that before turning, stopping or changing the course of a motor vehicle the driver shall give warning by the use of his arm or where the vehicle is so constructed that arm signals would not be visible mechanical or electrical warning devices must be used. Arm extended upward indicates turn to the right; pointed horizontally indicates turn to the left and downward indicates slowing down or stopping.

The headlight provision requires that headlights be so arranged, adjusted and constructed when the car is fully loaded that any pair of headlights must produce a light which:

1. When measured on level surface on which the vehicle stands, at distance of 200 feet directly in front of the car and at some point between the said level surface and a horizontal passing through top of the headlight reflector or lens, is not less than 1200 apparent candle-

2. When measured at a point 100 feet directly in front of the car and at a height of 50 inches above the level surface on which the

vehicle stands does not exceed 2400 apparent candlepower; nor shall this value be exceeded at a greater height than 60 inches.

3. When measured at a distance of 100 feet ahead of the car and 7 feet or more to the left of the axle of same, and at a height of 60 inches above the level surface on which the vehicle stands, does not exceed 800 apparent candlepower.

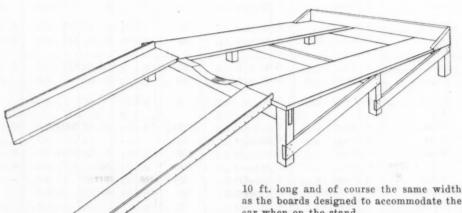
Motor car dealers are required to pay \$10 for the first set of number plates and \$5 for each additional set instead of \$25 for the first set and \$2 for each additional set as at present. The idea is to reduce the number of dealers' plates in use.

The name of the legal owner of a car must appear on the bottom line of the registration certificate. This is new and is to protect the proposed purchaser against misrepresentation of ownership. Application for a transfer of ownership must be signed by both the transferee and the legal owner. Upon transfer, title to the number plate vests in the transferee. Dealers need no longer make application to the department for registration of a used car. He can enter into joint indorsement and make transfer direct by forwarding the certificate thereon to the motor vehicle department.

A feature of the new law to which truck operators already are objecting provides that chartered cities are permitted to vary the maximum weight per inch of widths of tires prescribed by the act. Truck operators say this will mean much trouble.

ractical Vaintenance Lints

Special Racks Makes Car Washing Easy



WASHING a car while standing on a floor does not mean the best job that can result, for it is impossible to thoroughly clean the wheels, the under sides of the fenders, axles and other parts, for not one washer in a hundred will take the pains to stoop

down sufficiently to accomplish the work as it should be performed.

A simple and effective means of getting the very best results lies in the installation of a rack upon which to run the car to raise it from 12 to 18 in., thus making it an easy matter to get at all parts, even well under the car.

Such a rack may be constructed by any man handy with tools and such an affair is illustrated. This may bear alterations to meet needs, of course. It should, however, be in the neighborhood of 18 in. high, sufficiently long to easily take the longest car and sufficiently supported and braced to stand not only the weight of the heaviest car but also to withstand driving up and on to it. This means it must be well anchored to the floor, and the runways ought to have thin cleats on them to give traction. Laths will do for this purpose if well nailed.

Width of Runway

The width of each runway ought to be sufficient not only so the two will accommodate the car but to leave from 6 to 10 in. outside to form a platform upon which the washer may walk, for otherwise the car would be so high when on the stand that he would not be able to reach the higher portions, such as the top.

The angle of the runways will have to be determined by the amount of room provided in the garage for a straight run. Ordinarily they need not be more than 8 or

as the boards designed to accommodate the car when on the stand.

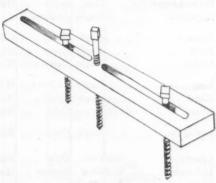
At the back end of the stand there should be a bumper at least 10 in. high, well braced, so the car cannot go over the end and be damaged.

Naturally such a stand could not be used where a car is shoved on the washrack; it is a case of using the engine power. It is the general custom now to use the engine, although some owners forbid it and in some garages the proprietor will not allow employees to operate the cars under their own power. In this case, too, such a stand

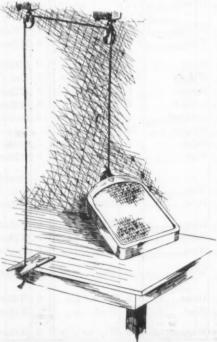
would not be of much use. A modification of this scheme, however, made out of 1/4-in. round stock. One end is bent circular to form an eye which encircles the wristpin, and the other end is provided with a cross handle.-Connel & McCone, Overland, Boston, Mass.



The puller shown is for removing timing gears from various Continental engines.



The two outside screws engage holes tapped in the gear and the center screw does the pulling .- Connel & McCone, Overland, Boston, Mass.



Radiator tackle described last

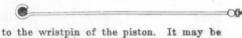
could be in a pit with two tracks laid leading down the long way, so a car could be shoved on to the tracks and thus the same effect would be produced. This scheme would mean the catch basin would have to be set down in the bottom of the pit and the floor, of course, would have to slope toward the catch basin.

It has been found where such an idea is used the cars come out cleaner, particularly in and around the spokes, under the fenders and around the axles and springs, and this means a better satisfied owner. Such a rack can be used also in repair work in a small place during the day and then again used by the garage portion to wash the cars at night.

Piston Lapping Tool

The lapping of pistons or rings is facilitated by the use of a long handle attached





Singl

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

	IGNITION			GENERATOR		MOTOR		BAT	TERY		Wir- ing	Type of Elec-	of FUSES		
Make and Model	Sys- tem	Make	Con- trol	Make	Volt age	Make	Volt age	Make	Amp. Hr.	Volt age	Sys- tem	tric Sys- tem	Туре	Volts	Am
llen41	Single	Conn	Hand	A-L	6	A-L	6	U. S. L	90	6	1		GT	5	15
		At-Kent	Hand	West	6	West	6	Columbia	80	6	1		3-A	1.250	20
ndersonAll	Single	Conn	Hand	West	6	West	6	Willard		6	1	S	SAE	6	1 5
pperson8-19		Remy	Hand	Bijur	6	Bijur	6-8	Willard	90	6	1	S	Open	1.250) 10
uburn6-39	Single	Remy	Hand	Remy	6	Remy	6	Willard	80	6	1	S		6-8	2
		Delco		Delco	6	Del c o	6	Willard		6	1	S	None		
iddleH	Single	Eisemann.	Hand	G & D	6	G & D	6	Willard	90	6	1	S	GT	6	1
irch	Single	Conn		A-L	6	A-I	6	Willard	80	6	1	S	GT	6	1 2
rewster	Single	Conn		A-L	6	A-L	6			-	1				
riscoe4-24		Conn	Hand	A-L	6	A-L	6	U. S. L	80	6	1	GI	GT	6	1
uick	Single	Delco	Hand	Delco	6	Delco	6	U. S. L	80	6	1	S			
Cadillac	Single	Delco	Hand	Delco	6	Delco	6	Exide		6					
Campbell				A-L				Willard		1	1				
	Single		Hand	West	6	West	6	Willard	1171/2	6	1	GI	3AGT	50	1
Chalmers35C		Bosch-Rem	1	West	6	West	6	Willard	93	0	1	G1	0.10.1	100	1
	1 -			West	6		6				1	S	Cart	6	2
Chandler	Single	Bosch	Hand	1	-	West		Willard	100	6	1			1	
Chevrolet All		Remy	Hand	A-L	6	A-L	6	Willard	80	6	1	GI	GT	6	2
Cole		Delco	H & A.	Delco	6	Delco	6	Prest-O-L	50	6	1	S			
ColumbiaAl		At-Kent	Hand	Ward-L	6	Ward-L	6	Prest-O-L	80	6	1	S			
Comet	Single		H&A.	Dyneto	6	Dyneto	6	Willard	75	6					
	Single		Hand.	West	6	West	6	Willard	120		1				
Daniels8-F	1	1	1	West	6	West	6	Willard	100		1	S	GT	5-8	1
The state of the s		Bosch	manu	West	6		6		100		1	0	01	3-0	1
Davis	1				-			Willard							
Dixie Flyer	Single	1		Dyneto	1		6	Willard	6-60		2	035	T 1	4.50	1
Dodge	Single		100,000	N. E		1		Willard		12	1	1	Encl		- 1
Dorris	Single		Hand	. West	6	West		Willard	115	6	1	S	GT	5-8	
Dort1	Single	Conn	Hand	. West	. 6	West	6	Willard	85	6	1	S		. 6	1
ElearAl	Single	At-Kent	Hand	. Dyneto	. 7	Dyneto	6	Willard	90	6	1				
Elgin	Single	Wagner	. Hand					Willard	90	4- 9	1				
		Delco		. Delco	. 7	Delco	6		105	6	1	S			
FordT	Single	Own	. Hand	Own	1	. Own		Exide	30	6	1 .	s			
		At-Kent		Dyneto	. 12			Willard	50		1		GT	122	
Frankiii	Single	At-Kent	Auto	. Dyneto	14		3	willard	30	12		· CM		122	
Geronimo		. Delco		. Dyneto	. 6	Dyneto	6	Willard	. 88	6	1	S			
Glide6-4	0	. West		. West	. 6	West	6		. 80	6	1	GI. a	. Cart	. 250	
Harroun	. Single	At-Kent	Hand	. Remy	. 6	Remy	. 6	Willard	. 80	6	1				
Harvard4-2	0	. At-Kent		. Wagner	. 6	Wagner	. 6	Nat. Carb			. 1	S			
Hatfield	A	. Conn		. Dyneto	. 6	Dyneto	. 6	Willard	. 100	6	1	GI			
	Single	Delco	. Auto	. Leece-N	. 6	Leece-N	. 6		120	6		GI	. C. B		
	Single		. Hand	. Splitdorf	. 6		. 12		50	6		035			
Holmes			. Auto	. Dyneto	-		1	. Columbia	100				2A	. 15	1
	. Dual	1.00	Hand.	. Delco	. 7		7			12		No.		. 10	1
	R Single	Delco	Hand	. West			1 7		. 100	6		-	Encl	. 6	
Jackson		Remy	. S-A			LA CONTRACTOR		Prest-O-L	. 120	6			3 A	. 6-8	
Jones			Hand.	West	. (West	. 6		. 120	1 6	1	-			
Jordan		Delco		. Bijur	. (. 6		. 109.8				. C. B		
King	8 Single		H & A.	. Bijur		Bijur	. 6	Willard	. 117.5	5 6	1				
Kissel	. Single	1	. Hand.	Remy		Remy	. (. 90	1		S	. 3 A. G		
	Single		Hand.	West		6 West		Prest-O-L.		1				6	
LexingtonR-	13		Hand.	West		6 West	. (Willard	. 100		3 1	S	G. T	6	
T 11 10	B Dual	Delco	Hand.	Delco		6 Delco		Willard	. 88	1	3 1	GI			
Liberty		per transfer a a a	- Immediate -		1				. 00	1.	- 1				
	-2 Dual	Berling	Hand.	West		6 West		Willard	. 120	116	3 1	S	. G. T	6	

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Ward-L, Ward-Leonard; West, Westinghouse; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite, G & D, Gray & Davis; Leece-N, Leece tion, Motor combined; S, Generator, Motor, Ignition separate; GM, Generator and Motor combined. Fuses: GT, Glass Tube; Cart, Cartridge;

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

	LAM	P CANE	DLEPOWE	ER, VOLL	AGE A	ND TYPE	E OF BA	SE	SPAR	K PLUC	S		
Base -	HEADLI	GHTS	SIDELIGHTS			IGHT8	DASH	LIGHT		Diam.	Thread	Horn	Make and Model
,0,1,1,1	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.	Make	Inches	Pitch		
ingle	6-8	18	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	Garford	Allen
ingle	6-8	15	*6-8	4	6-8	2	d6-8	2		7/8	18		American
ingle	6-8	12	6-8	2	6-8	2	6-8	2	A. C	7/8	18		Anderson
ingle	6-8	15	*6-8	4	6-8	2	d6-8		A. C	7/8	18		Apperson8-1
ingle	6-8	15	*6-8	4	6-8	2	d6-8		Rajah	7/8	18		Auburn
ingle	6-8	24	6-8	16	6-8	6	6-8		Reflex	7/8	18		Austin
Single	6-8	18	*6-8	4	6-8	2	d6-8	4	Splitdorf.	7/8	18	Klaxon	Biddle
ouble	6-8	15	*6-8	4	6-8	4	6-8	4		7/8	18		Birch
									Herz-Boug.	7/8	18	Klaxon	Brewster
ingle	6-8	21			6-8	4	d6-8	4	Champion.	7/8		Schwarze	Briscoe4-
lingle	6-8	16			6-8	3	6-8	3	A. C	7/8	18	Stewart	Buick
	6-8	18	6-8	6	3-4	2	3-4	2	Titan			Auto-horn.	Cadillac
					6-8				A. C				Campbell
ingle	6-8	18	6-8	4 .	6-8	2	d6-8	2	A. C	7/8		Klaxon	Case
lingle	6-8	15	6-8	4	6-8	2	6-8	2	A. C				Chalmers35
ingle	6-8	16	6-8	4	6-8	2	6-8		A. C	7/8	18	- A	Chandler
- 1	6-8	20	6-8	4		4	6-8		A. C	7/8	18	Kla'on	Chevrolet
ingle					6-8								
ingle	. 6-8	21	*6-8	12	6-8	4	d6-8	6	A. C	7/8	18		Cole
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18		Columbia
ingle	6-8		3-1		3-4		3-4		Champion.	7/8	18	Trojan	CometC
	6-8	16	6-8	4	6-8	2	6-8	2	Champion.	7/8		E. A. Lab.	Crow-ElkhartK
	6-8	21	6-8	6	6-8	2	6-8	4	Champion.			Sparton	Cunningham
Single	6-8	18	6-8	2	6.8	4	6-8	2	A. C	5/8	18	Klaxon	Daniels
	6-8	18			6-8	2	6-8	2	A. C	7/8		Klaxon	Davis
Double	6-8	15			3-4	2	3-4	2	Champion.	0.11		Garford	Dixie Flyer
Single :	12-18	15			12-18	2	12-18	2	A. C	7/8	18	Klaxon	Dodge
Single	6-8	21	*6-8	4	6-8	4	6-8	4	Champion A. C		18	Klaxon	Dorris
Single	6-8	15			6-8	4	6-8	2	A. C	7/8	18	Schwarze.	Dort
	6-8	15	6-8	4	5-8	2	6-8	2	Champion.			Klaxon	Elcar
Double	6-8	15			6-8	3	6-8	2	Champion.	7/8	18	E. A. L	Elgin
Single	6-8	15			3-4	2	*3-1	2	A. C	18 m.m.	1.5 m.m		Essex
	0.0		0.0					1000		11		Carl State	12 11 44
	6-8	17	6-8	2	6-8	2			Champion.	1/2	pipe	own	Ford
Double	12-18	21	*12-18	4	8	2	12-18	2	Splitdorf. Benton	7/8	18	Klaxon	Franklin
Single	6-8	21		1 - 10	00	2	6-8	2	Champion.	7/8	18	Trojan	Geronimo
		15	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18		Glide
Single			0-0	. 4	6-8	Carried III				/8	10	Klaxon	
******	6-8	20			3-4	6	3-4	6	A. C			. Schwarze.	. Harroun
	6-8		. 3-4		3-4		*3-4				18		. Harvard
Single	6-8	15	*4-8	4	6-8	4	6-8	2	A. C		18	Ecco	Hatfield
Double	6-8	18	*6-8	12	6-8	2	6-8	2	A. C	7/8	18	Klaxon	
Single	6-8	15			3-4	2	d*3-4	2	Champion.	7/8	18	Sparton	Hollier
Double		30	*12-16	4	6-8	2	6-8	2	Bethlehem	7/8	18	Klaxon	
Single	6-8	5	6-8	4	3-4	2	*3-4	2	A. C	7/8	18	Sparton	A CONTRACTOR AND A CONT
Single	6-8	15	6-8	2	6-8	2	6-8	2	A. C	7/8	18	Trojan	
*******									. A. C				. Jackson
Double	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion.	7/8	18	Newtone.	
Single	6-8	21	*6-8	4	6-8	3	6-8	3	A. C		18	Sparton	
			1		1 3/5/1	10101					-1011		Transfer or the second
Single	6-8	18	*6-8	4	6-8	4	6-8	2	Champion.	7/8	18	E. A. L	0
Single	6-8	18	*6-8	4	6-8 6-8	2	6-8 d6-8	2 4	A. C Champion.	7/8	18	. Sparton	Kissel
Single		32	*6-8	8	6-8	2	d6-8	4	Champion.		18	101 103010	Lexington
		02	0.0	1	0-0	-	200	*	Bethlehem		20	Laida OII.	Amelina II de
Single	6-8	15	*6-8	4	6-8	. 2	6-8	2	A. C	7/8	18	United	. Liberty
Single	6-8	21	6-8	6	6-8	40	6-8	2	A. C		18	Klaxon	
	1 , - 0	-	1		1			1		10	1		1
Single	6-8		6-8		1	2	*3-4			. 7/8	18		. Maibohm

Auto, Automatic; H & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-Ne, Leece-Neville; Neville; West, Westinghouse. Battery: Prest-O-L, Prest-O-Lite. Wiring system: GI, Generator and Ignition combined; GIM, Generator, Igni-C. E., Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Do

Do

Sin

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Sing Sing Sing Dot Dot

Dot Sing Sing Sing Sing

Sing Sing Sing Sing

Sing

Sing Sing Sing

Sing 4 S-

Sing

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

	IGNITION			GENERATO	OR	MOTOR	347	BATT	TERY	1	Wir- of Elec-		FU	ISES	
Make and Model System		Make	Con- trol	Make	Volt age	Make	Volt age		Amp. Hr.	Voltage	Sys- tem	- tric	Туре	Volts	Amp
Marmon34 Sing	gle	Bosch	Hand	Bijur	6	Bijur		Prest-O-L	120	6	1	S	Cart		. 20
Maxwell25 Sing			Hand	Simms-Huff	12	Simms-Huff	12	Prest-O-L	35	12	1	GM	Cart	12	20
McFarlan127 Dou			Hand	West	6	West	6	Willard	5 Amp. 27.8 h. p.	} 6	1		5 A. G	6	
MercerSer. 4 Sing	gle	Berling	Hand	Remy	6	Remy	6	Willard	90	6	1	S	Cart		. 10
Mitchell E-40 Sing		_	Hand	Remy	6	Remy	6	Willard	100	6	2			6	20
Moline Knight L Dua			Hand	Wagner	6	Auto-Lite	6	Willard	117	6	1		Cart	250	20
MonitorSing			Hand	Dyneto	6	Dyneto	-	Willard	88	6	1	10	Cartin	250	20
Moon All Sing			Auto	Wagner		Wagner	6	Exide	80	6	1	1			****
					6		6		1		2				
Moore30 Sing			Hand	A L	1 -	A L		Willard	80	6					
Nash Sing	gle	Delco	H & A	Delco	6	Delco	6	Willard	100	6	1	S.:			
National6 Sing			Н & А		6	West		Prest-O-L	110	6					. 5
National		Delco	H & A	Bijur	6	Bijur	6	Prest-O-L	110	6		S	. G		. 10
Oakland34-B Sing			Hand	Remy	6	Remy	6	Prest-O-L	85	6	1	GI			
Oldsmobile All Sing			Hand	Delco	6	Delco	6	U. S. L	80	6					
Olympian			Hand	A L	6	A L	6	U. S		. 6	1			1	
Overland90 Sing			Hand	A-L	6-8		6	U. S. L	75	6-8		. GI	Glass	6	20
Packard3-25 Sing		1	H & A		6	Bijur	6	Willard	120	6					10
			Hand	Gray & Davis		Gray & Davis		Willard	108.4					0	20
Paige	gle				6		6	Willard	100.2	0			G		20
		Delco	Hand	Delco		Delco				6		1			
Peerless Ser. 4 Sing			. H & A	. A-L	6	A-L	6	Willard	105	. 6	100				10
Pierce-Arrow B-5 Dou			Hand	. West	6-8		6	Exide-Willard	135	6			5 A. G		10
Pilot6-45 Dus		Delco	Hand	. Delco	. 6	Delco	6	Prest-O-L		. 6					
Premier6-C Sing	gle	Delco	Hand	. Delco	. 6	Delco	6	Willard	123.5			100000			
ReoT & U Sing	gle	Remy	Hand	Remy	. 6	Remy	6	Willard	108.5	6	2	GI	. Wire	6	5
RevereSing			Hand	North East	. 6	North East	6	Willard	120	6		100000			
Roamer6-54 Sing		Bosch	Hand	. Bijur	. 6	Bijur	6	Willard	115	6	1	S	. 3A	. 6	10
SaxonY-16 Sing			. Hand	. Wagner	. 6	Wagner	6	Prest-O-L	60	6		S	. Cart		15
SayersSing	-	Delco		Delco	. 6	Delco	6	Willard		. 6					
Scripps-Booth Sing	-		Hand	Remy		Remy	6	Prest-O-L.	80	6					
Seneca	ala		Hand	Allis Chalm	. 6			Willard	88	6	1	GM	1 1 15	1	20
Singer "19"		Bosch	Hand	West	6	West	6	Willard	115	6					5±10
		Split	Hand	West	6	West		Willard	160	6	-		G. C		Own
	gle	Split	Hand		6	west	0						0.4		20
				. Remy	1		10	Willard	100	6			. Cart	. 6	20 20
Stearns SKL-4 Sing		Remy	. Hand	. Remy	. 12	Remy	12		61.5	-					20
417	_	Delco	. Hand	. Delco	. 6		6	1	. 80	6	100	-			
StudebakerEH Sing	- 1			. Wagner			.6	Willard	80	6			. Cart	. 6	10
Stutz			Hand		. 6		6			. 12					
Templar445 Sing	gle	Remy	. H & A	Remy	. 6-8	Remy	6		100		. 1				
TulsaA-D-1 Sing	gle	Delco	. Hand	. Dyneto	. 6	Dyneto	6	Willard	90	6	1		. G. T	. 6	15
	0			. Remy	. 6			Willard	105	6				. 6	5
WestcottSing	-		H & A		. 6		6						. C. B	. 7	25
Willys-Knight88-4 Sing			Hand		6-8		6	U. S. L	120	6			G. T	. 6	20
Winton SixAll Sing	gle	Bosch	Hand	Bijur	. 6	Bijur	6	Willard	110	6	1	s	3A	. 6	20

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Ward-L, Ward-Leonard; West, Westinghouse; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite, G & D, Gray & Davis; Leece-N, Leecetion, Motor combined; S, Generator, Motor, Ignition separate; GM, Generator and Motor combined. Fuses: GT, Glass Tube; Cart, Cartridge;

R. R. MAN URGES TRUCK USE

New York, May 16—Replacement of short line railroads with motor truck service, and thereby decreasing the expense of the main line railroad, was one of the suggestions given by C. A. Morse, assistant director of operation in charge of engineering and maintenance for the U. S. railroad administration in a paper delivered before members of the New York Railroad Club. The serious consideration of this has been necessitated by the deficit attached to the

maintenance and operation of the feeder lines.

If the traffic could be handled without a bill of expense by motor truck transportations it would be a decided advantage, even though it might call for increased facilities along the main line for storage, trackage and hauling of freight, as it would mean the concentration of supervision and labor, and permit better housing and living conditions for employes. The change would require good roads, of course.

ORGANIZE LIBERTY HIGHWAY

Springfield, Ill., May 16—At its first annual convention, held here today, the national organization of the Liberty Highway Association was effected. Stephen Lawless, Liberty, Ill., was elected president, and Truman T. Pierson, Quincy, Ill., treasurer and national organizer. Other officers are: Vice-presidents, R. J. Holmes, Decatur, Ill.; C. A. Hetrick, Asbury Park, N. J.; Joseph T. Daniels, Columbus, O.; George A. Binkert, Quincy, Ill., and W. H. Conkling.

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Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

	LA	MP CA	NDLEPOV	VER, VOL	TAGE A	ND TY	PE OF BA	ASE	SPA	RK PLU	GS			
Base Contact	HEADI	LIGHTS	SIDELI	GHTS	TAILL	IGHTS	DASH	LIGHT		Diam.	Thread	Horn	Make and Model	
7	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.	Make	Inches	Pitch			
Single	6-8	30	*6-8	9	6-8	2	6-8	4	A. C	7/8	18		Marmon	
Double.,	12-16	24	*12-16	2	12-16	2	12-16	2	Champion.	7/8	18	Schwarze	Maxwell	
Single	6-8	21	*6-8	12	6-8	2	6-8	2	A. C	7/8	18	Klaxon	McFarlan12	
Single	6-8	24	*6-8	4	6-8	4	6-8	4	Champion.	7/8	18		MercerSer.	
Double	6-8	14			s6-8	4	6-8	4	A. C	7/8	18	A. E. L	Mitchell E-4	
	*6-8	15	*6-8	4	6-8	2	6-8	2	A. C	7/8	18	Klaxon	Moline Knight	
									Champion.	7/8	18	Klaxon	Monitor	
Single	6-8	18			6-8	2	d6-8	2	Champion.	7/8	18	Trojan	Moon	
Single	6-8	20	6-8		6-8	2			Champion.	7/8	18	Garford	Moore	
Single	6-8	18	*6-8	4	6-8	2	6-8	2	Champion A. C	7/8	18	Stewart	Nash	
Single	6-8	16	*6-8	6	6-8	4	d6-8	2	A. C	7/8	18	Sparton	National	
Single	6-8	18	*6-8	6	6-8	4	d6-8	2	Champion.	7/8	18	Trojan	National	
Single	6-8				6-8	2	6-8	2	A. C	7/8	18	Klaxon	Oakland34-	
	6-8	15			6-8	2	6-8	2	A. C	7/8	18	Optional	Oldsmobile37-	
									Champion.				Olympian	
	6-8	12			3-4	2	*3-4	2	Champion.	1/2			Overland	
Single	6-8	24	*6-8	4	6-8	2	6-8	2	A. C	7/8	18		Packard3-	
Single	6-8	18	*6-8	4	6-8	2	d6-8	2	A. C			Trojan		
	6-8	24	6-8	4	3-4	3	*3-4	3	A. C				Paterson6-	
Single	6-8	18			6-8	4	6-8	2	A. C			Sparton		
Single	6-8	21	*6-8	4	6-8	4	6-8	4	A. C	7/8	18	Klaxon		
Single	6-8	15			6-8	6	6-8	6	A. C	7/8	18	Schwarze.		
Double	6-8	21	*6-8	4	6-8	2	6-8	2	A. C	7/8	18	Stewart		
Double	6-8	15			3-4	2	*3-4	2	A. C	7/8	18		Reo T & U	
Double	6-8	20	*6-8	8	6-8	4	6-8	4	Rajah	7/8		Klaxon		
Single	6-8	16	*6-8	4	6-8	4	d6-8	4	Champion.	7/8	18	Sparton		
Single	6-8	15			6-8	2	6-8	2	A. C	7/8	18	Schwarze.		
Single	6-8	15			6-8	2	d6-8	2	Champion.			Stewart		
Single	6-8	15			6-8	2	6-8	2	A. C			Trojan		
Single	6-8	15	6-8	2	6-8	2	d6-8	2	A. C				Seneca	
Double	6-8	32	6-8	4	6-8	2	6-8	2	A. C	7/8	18	Klaxon		
Single	6-8	32	*6-8	4	6-8	2	6-8	2	Splitdorf	7/8	18	Klaxon		
Single	6-8	18	*6-8	2-4-6	6-8	2	6-8	2	opiidoi1	/8		Klaxon		
Single	12-16	12	*12-16	4	12-16	2	12-16	2	A. C	7/8	18		StearnsSKI	
Single	6-8	15	6-8	2	6-8	2	6-8	2	Champion.			Trojan		
Single		12	0.0		6-8	2	6-8	2	Champion.	1/2			Studebaker E	
	00	. 15	*	4		4		. 4	A. C	12		Klaxon		
Single	6-8	18	*6-8	4	6-8	2	6-8	2	Champion.	7/8		Schwarze.		
Single		21	6-8	2	6-8	2	d6-8	2	Champion.	7/8	18	Klaxon		
Single		15	*6-8	4	6-8	4	d6-8	4	Champion.	7/8	18	Sparton		
Single	6-8	15	*6-8	4	d3-4	2	d*3-4	2	A. C	7/8	18	Klaxon		
4 S-D2	6-8	16			3-4	2	*3-4	2	Champion.		18	Klaxon	. Willys Knight88	
Single	6-8	21	6-8	12	6-8	4	6-8	4	Champion.	7/8	18		Winton Six	

Auto, Automatic; L. & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; Neville; West, Westinghouse. Battery: Prest-O-L, Prest-O-Lite. Wiring system: GI, Generator and Ignition combined; GIM, Generator, Igni-C. B., Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

NEW CONCERN FOR WISCONSIN

Oshkosh, Wis., May 16 — Wisconsin Axles, now standard equipment on many trucks, are to be custom manufactured on a much more extensive scale by the Wisconsin Parts Co., a new corporation which has purchased the assets of the E. B. Hayes Machinery Corp., of Oshkosh. The Wisconsin Parts Co. has a capital stock of \$500,000, of which \$300,000 is in preferred and \$300,000 in common stock.

Heading the corporation as president and

general manager is W. F. Rockwell, formerly vice-president, in charge of engineering and production, of the Torbenson Axle Co. Louis Schriber, vice-president of the Old National Bank of Oshkosh, is treasurer.

The Wisconsin Parts Co. will continue the manufacture of Wisconsin worm drive axles for trucks of from one to five tons capacity. In addition a tractor axle has been designed and is now in process of manufacture.

NEW ELECTRICAL EQUIPMENT CO.

Dayton, Ohio, May 16—New systems of automotive electrical equipment, including magnetos, distributers, generators and starting motors, have been worked out at the central plant of the Recording & Computing Machines Co. and will be manufactured from that plant. The concern has been engaged during the period of the war in manufacturing shell time fuses, and the automotive work now being planned is an entirely new line for it.

Sizes of Brake Linings for Cars

Motor Age Maintenance Data Sheet No. 37

One of a series of weekly pages of information valuable to service man and dealer-Save this page

1917 Models

		ERNAL	Thick-		TERNAL	Thick-		INT	TERNAL	Thick-	—-EX		hick-
	Length		ness		Width		Car and Model—	Length	Width	ness	Length	Width	ness
remier—6-B	431/4	2	18	40	2	16	Stanley—730		13/4	16	$35\frac{1}{2}$	13/4	18
ıllman—424		13/4	32	351/4	13/4	32	Stearns—SK8		3	1/4	96	2	1/4
gal—J	317/8	13/4	7/8	271/4	13/4	16	Stearns—SKL4		3	1/4	80	11/2	1/4
o—R & S	43	2	16	3818	2	18	Stephens-60-65		2	1/8	$31\frac{1}{4}$	13/4	1/8
o—M-N-F		21/4	16	3813	2	16	Studebaker—All	44 16	2	32	421/2	13/4	n
xon—6		13/4	1/8	24	13/4	1/8	†Stutz—R				\$16½	13/4	37
xon-4	211/2	11/4	1/8	$21\frac{1}{2}$	11/4	1/8					$(16\frac{1}{2})$	13/4	3/3
yers—A	31	13/4	18	0077/	497		Velie—27		2	16	401/4	2	13
**	32	2	32	277/8	13/4	32	Velie—28		118	16	$35\frac{1}{4}$	13/4	17
cripps-Booth-G	$27\frac{1}{8}$	15/8	32	2831	15/8	32	Westcott—S-17		2	18	41	2	18
leneca—17A				(37	1	1/8	White	46	$2^{1/2}$	18			
		011		(37	1	1/8	Willys-Knight—All	441/2	21/4	16	13	21/4	13
inger—17		21/2	16	471/2	21/2	18	Winton—All	483/4	$2\frac{1}{2}$	16	443/4	$2\frac{1}{2}$	13
andard—F	45	2	16	411/2	2	18							
					101	12 1	Models						
					17.	10 1	rioueis			TK-10	er so		
bbott-Detroit-6-44.		13/4	1g	36	2	3	Liberty—10-B	37 18	118	18	2313	21/2	73
llen-41		2	32	343/4	13/4	32	Locomobile-All	485/8	3	16	1435	21/2	1
nerican—B		2	18	44	2	16	Lozier-82 & 84	50	13/4	16			
person—8-18		21/4	16	46	2	16	Maibohm—B		13/4	1/8	351/2	13/4	1
burn-6-39B		13/4	3 16 a				Marmon—34		2	3	471/8	11/2	7
ustin—12-cyl		3	1/4	42	3	1/4	Maxwell—25	177/8	11/2	18	347/8	11/2	i
ddle—H		2	32	401/2	2	32	McFarlan—All	54	$2^{1/2}$	32	491/2	21/2	7
riscoe-4-24		11/2	32	275/8	11/2	32	†Mercer—All				§12	21/2	4.
E-44-45-46-47	381/8	17/8	52	35	15/8	52	Mitchell—C		11/2	1 ³ c	173/8	$\frac{2^{1/2}}{1^{1/2}}$	7
E-49-50	4315	17/8	32	401%	15/8	5 32	Mitchell—D	381/2	2	18	351/4	2	. 2
dillac—57	2.0	21/2	3 16	51	21/2	3 16	Moline-Knight-All.	421/2	2	16 3	40	2	. 2
mpbell		13/8	· 9	35	13/8	16	Monitor—All	36	2	16	10		
se—U		2	16 32	40	13/4	5 32	Monroe-6	34 %	2	3	311/4	13/4	
	(431/2	13/4	32	413/4	11/2	32 16	Moore—All	363/4	13/4	18	35	17/8	7
halmers—6-30	1431/2	23	16	413/4	118	16			2	16 3 16			
nandler—All	451/8	2 2	16 3 16	43	13/4	16	*Nash—All	18+1	21/2	16			
evrolet—490		11/4	16 5	261/2	11/4	16	National-All		2 2	18	431	13/4	3
evrolet—F, A & D	3713	13/4	32	$34\frac{1}{2}$	13/4	22	Oakland—34B	343/4	17/8	32	35	15/8	2
ole—870		2	32 32	4316	13/4	32	Oldsmobile—45A		17/8	32	4018	15/8	22
lumbia—D		13/4	32	413/4	11/2	32	Oldsmobile—37	381/8	17/8	32	35	15/8	22
met—C-51		2	18 3 16	421/2	2	16 3 16	Olympian—45		13/4	32	351/4	13/4	93
awford—6-40		2	16 3 16	41	2	16 16	Overland—90		13/4	32	121/2	13/4	2
inningham—V-3		21/2	16	49	21/2	16	Overland—85-6		21/4	16	10 3	21/4	1 00
xie—LS		13/4	16	361/2	13/4	16 3 16	Owen-Magnetic—		274	16	70.18	474	
odge—All		21/4	16	143/8	13/4	16	W-42	503/4	21/2	78	203/4	21/2	
orris—6-80		21/2	16	467/8	21/2	16	Packard—All	53 54	21/2	- 1/4	471/2	21/2	
ort—All		15/8	16 5	35	15/8	16 5 32	Paige—6-39		2 2	74	351/4	2 2	7
ouglas—G		2	33	407/8	2	32 3 16	Paige—6-55		2	18	42	2	
car—All		2	16	36	2	16	Pathfinder—6		21/4	18	341/4	21/4	7
gin—All		13/4	16 5 32	343/8	2	16 5 32	Pathfinder—4		274		341/4	2 2	
mpire—All	7.0	13/4	32	371/2	13/4	_3_	Peerless-56		2	16	383/4	2	7
at—E-17		2	1/4	19	2	1/4	Pierce-Arrow—6-66.		31/4	18	19	3	
Ford—T	233/8	11/8		No li		74	Pierce-Arrow—6-48.		31/4	16	19	3	CCI
	(28	23/4	32				Pierce-Arrow—6-36-3	8 151/	3	18	135/8	23/4	10
Franklin—Series 9.	237/8	3	32				Pilot—36	36	2	16	34		7
lide—6-40	41	2	16	401/2	2	5	Premier—6C		2	32		13/4	3
			32 5		13/4	32	Reo—T & U		2	18	40	2	7
rant—G		13/4	32 5	351/4	2		Reo—M-N-F			18	3813	2	7
arroun—AA1		2	32	35 (151/2	13/4	32	†Revere—All		21/4	18	3818	2 13/4 & 11/2	1
Haynes—All				151/2	13/4	32	Sayers—A	31	13/4	18			
folmes	213/4	$2^{1/4}$	16	40	$2\frac{1}{16}$	1/4	Scripps-Booth-6-39.		15/8	32	35	1%	7
Iudson—Supersix		2	10	391/8	2	16	Scripps-Booth-6-40.		17/8	32		17/8	1
upmobile—R		2	32	337/8	13/4	1/8	Seneca—D	371/4	2	1/8	36	17/8	1
ones—27	433/4	2	32	391/2	2	372	Singer—18	481/2	21/2	18	471/2	21/2	
ordan—C	433/4	2	18	383/4	2	16	Standard-G		2	16	411/2	2	
ing—F	45	2	32	4316	13/4	52	Stanley—All		2	1/4	371/2	2	
isselKar—All	881/2	2	16				Stearns—SKL4	. 25	3	1/4	80	11/2	1
linekar-6-38-GA	67	13/4	16	67	13/4	18	Stearns—SK8	25	3	1/4	96	2	
linekar—6-38-H	67	2	16	67	.2	16	Stephens-70-75	. 43	2	IL 33	37%	13/4	+ ,
enox—All	78	21/4	18	84	21/4	18	Studebaker-All		2	22	421/2	13/4	
exington-All	24	2	32	38	2	32	†Stutz—S	900			(161/2	13/4	
exington—All													
*Tranmission bral		230		600			Btuta_B			9.00.00	161/2	13/4	

Service Equipment Time Savers of the Shop

Ford Rebabbitting Jig

THE jig made by the Tribune Engineering Co., Inc., Owego, N. Y., has an accurate crankpin core and a wristpin core which fits in the rod. The wristpin core is movable so that the slight variance in rod lengths can be met.

Water Still for Batteries

A still allows the battery service department to operate at less expense than if it bought its distilled water, for the cost of operation with gas is 2 cents a gallon. The copper nickle-plated type is the correct one to use. It costs \$12 and is made by the Latimer Mfg. Co., Ludington, Mich.

Powers Fender Protectors

These fender protectors offer protection from the grease and the nicks the tools give the surface. The protectors are offered in materials from white cotton duck to rubber drill, and all are large enough to fit any car. They also serve as seat covers while the mechanics are working on the car. They are manufactured by the Powers Co., Waterloo, Iowa.

Hobart Battery Charger

Hobart Brothers Co., Troy, Ohio, is offering a new-size battery charging outfit for the medium-sized service station, model HB16. This set has a 1-kw. generator and two separate panels, each of eight-battery capacity. With this arrangement it is possible to secure a wide range of control for the batteries under charge. Each panel has its own ammeters, fuses, regulators and switches, all mounted on an oil-finished slate panel. The generator has the armature and the rotor mounted on the same shaft which runs in SKF ball bearings.

Non-Gran Bushing Metal

The American Bronze Co., Berwyn, Pa., manufacturer of Non-Gran bronze, is making for motor car dealers an assortment of Non-Gran metal for bushing stock. These bars offer a wide range in sizes, for fifty-four different sizes of bushing can be turned up from the assortment.

Storm Piston Vise

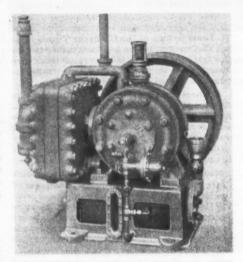
The Storm vise is made to hold the piston while fitting in new rings. The gripping clamp is lined with soft metal so that no scratching or marring is done to the piston. The vise is bolted down to the bench and it then becomes a permanent addition to the repair equipment of the shop. The vise is made by the Storm Mfg. Co., Thompson, Ohio, in one size only, for 3%-in. pistons. The price is \$10.

Rotary Garage Compressor

Something entirely new in air compressors for garage usage is offered by the Jackson Compressor Co., Inc., Denver, Colo. The capacity of the size illustrated is 11 cu.



Cleveland tool holder for lathe-equipped shop



Rotary garage compressor

ft. per min. compressed to a pressure of 100 lb. per sq. in. This compressor takes up a very small floor space, and since it has no reciprocating parts, does not vibrate. All bearings are mounted on Hyatt rollers, and the lubrication of these bearings is taken care of by the one lubrication supply

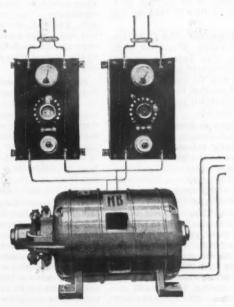
source. The price of this compressor is \$150.00, with a special discount for dealers.

Cleveland Tool Holder

The lathe equipped shop should have a good set of tool holders. For fine work, such as is required on a rush order for a bushing, the spring holder made by the Cleveland National Machine Co., Cleveland, Ohio, serves a need. The spring head of the tool holder enables work to be done in bronze or brass without fear of the tool grabbing and tearing the metal. The head is changeable to any angle, which enables the cutter to be used as a boring tool.

Portable Pressed Steel Work Stands

A work stand, such as the portable kind made by the New Britain Machine Co., New Britain, Conn., is a great help to the mechanic. It enables him to keep his tools together, and he does not have to lay the machine's parts on the running boards of the car, which method spots the boards up with grease. The trays are seamless drawn steel and have rounded corners so they may be wiped clean. The center tray can be adjusted to any desirable height. The drawer in the top tray is provided with a cylinder lock, and if a number of stands are used, these locks can be master-keyed.



Hobart battery charger for medium-sized service station

Among the Makers and Dealers Short Trade Notes

FIRE Destroys Garage—A blaze which started when a quantity of oil took fire destroyed the Orleans garage in Albion, N. Y.

Olds in Hartford, Wis.—The Ideal Service Garage, Hartford, Wis., Bulck and Oakland dealers, have also been appointed dealer in the Oldsmobile.

New Studebaker Dealer—Elmer Olson and Elmer Ramstead, Washburn, Wis., have formed a partnership as Olson & Ramstead to deal in the Studebaker.

Dodge Brothers Dealer Remodelling—Cronacher and Triesch, Dodge Brothers dealers at Fort Smith, Ark., are remodelling their building by adding a new show room.

Declare First Dividend—A first dividend of 15 per cent has been declared and ordered paid to creditors of the American Auto Body Co., North Milwaukee, Wis., recently declared bankrupt. The assets were sold to E. J. Patterson for \$7,750.

Fulton Trucks in Buffalo—Fulton trucks, made in Farmingdale, L. I., will be sold in Buffalo, N. Y., by the newly formed Fulton-Madine Corporation, which has leased salesrooms running through from 745 Main street to Washington street.

Twenty-two Per Cent Increase in Mack Sales—The sales of Mack trucks in April showed a gain of twenty-two per cent over the sales for March, the International Motor Co. announces. Forty-five per cent of these sales were of heavy duty Macks.

Davie Motor Co. Leases Building—The Davie Motor Car Co., distributors in St. Louis for the Stephens, Daniels and Elcar, have leased the five-story brick building at the southwest corner of Nineteenth street and Washington avenue. It has 45,000 sq. ft. of floor space.

Columbus Goodyear Man Changes—Avery C. Hammond who has been manager of the Columbus branch of the Goodyear Tire & Rubber Co., for the past 6 years has been appointed manager of the mechanical goods department for the same company for New Zealand and will sail in July to take up his new work.

Columbia Six in Milwaukee.—The Columbia Motor Car Co., Milwaukee, Wis., has been organized with I. L. Van Lare as general manager to act as distributer of the Columbia Six in Wisconsin and Northern Michigan. A sales, display and service station will be established in the downtown section of Milwaukee as soon as possible.

Connecticut Telephone & Electric Adds to Engineering Staff—F. J. Croton, Jr., and John A. Terrell, both recently released from government service, have been added to the engineering staff of the Connecticut Telephone & Electric Co., Meridan, Conn., Croton as mechanical engineer, and Terrell as assistant to the chief radio research engineer.

To House Commercial Cars—A re-inforced concrete garage, three stories high, to occupy the entire block from Seventeenth to Eighteenth streets and from Pine to Chestnut streets, with a total floor area of 228,000 sq. ft. and a capacity of 1,000 machines, is being planned by the Motor Garage & Realty Co., of which Nat W. Ewing, banker and insurance man, is president. The company will specialize in housing trucks operated by wholesale and retail establishments. A 99-

year lease has been taken on the property. It is announced that the building will cost \$300,000.

Houser With Gray-Heath—S. H. Houser, formerly sales manager of the Standley Skid Chain Co., Boone, Iowa, has joined the sales force of the Gray-Heath Co., Chicago.

Blackburn Joins Gray Motor Co.—William A. Blackburn, formerly factory manager of the Cadillac Motor Co., has assumed the management of the Gray Motor Co., Detroit.

New St. Louis Goodyear Manager—Frank S. Griesinger has been made manager of the St. Louis branch of the Goodyear Tire & Rubber Co., with which he has been connected for the last three years, in charge of truck tire distribution in the Southwest, with head-quarters in St. Louis.

Dunham, Carrigan & Hayden Company to Enlarge—Dunham, Carrigan & Hayden Co., San Francisco and New York are planning to enlarge their Auto Supply Dept. and with this end in view have put W. L. Tibbals, formerly with the Chanslor & Lyon Co. in charge of the purchasing of this line.

New Carlisle Cord Manager—A. G. Mc-Clurg has been appointed factory manager of the Carlisle Cord Tire Co. He has been with the Carlisle Co. several months in a consulting capacity. At present Mr. McClurg is overseeing the construction of the big new Carlisle plant now being built in Stamford, Conn.

New Service Station in Sloux City—William Warnock, Sioux City, Iowa, distributor for Liberty and Dort cars, and accessory jobber, has announced plans for the immediate construction of an automotive plant. The building will be five stories of reinforced concrete construction and will cover a quarter block. It will be ready for occupancy this fall and the estimated cost is \$500,000.

Columbia Ships Foreign Cars—The first shipment of cars going to northern European countries since the close of the war, has just been made by the Columbia Motors Co. Four cars have been shipped to the Denmark distributor. Stanley Watson, Inc., of London, England, have taken on the Columbia line and placed an order for a large shipment, even though no definite promise can be given at the present time as to when shipping space can be found.

Hardware Concern Issues Catalogue—The Supplee-Biddle Hardware Co., Philadelphia, Pa., has just issued a complete and detailed motor car accessory catalogue. In addition, during the month of May, motor car accessories are being especially featured by this concern, and every article of the large line is on display. The entire month of May has been set aside for a special effort by the selling force in the way of sales of motor car accessories and sundry lines.

Herff Motor Corp. to Build—The Herff Motor Corp., distributors for the Briscoe in six Southern states, with their offices at Memphis, Tenn., has contracted for the erection of a large plant at Memphis. The plant calls for a three story and basement building at the intersection of Lauderdale and Monroe avenues, with a 100 ft. frontage on Monroe avenue and 160 ft. on Lauderdale. The building will be ready for occupation September 1. The Herff Corp. reports conditions are very favorable throughout the South. They further

report that their allowance is oversold for 2 months in advance. Last year they distributed 1130 Briscoe cars.

Plug Co. Moves to Louisville—The Ignition Plug Co., formerly of Dayton, Ohio, has moved its plant to Louisville, Ky., and will manufacture a spark plug known as the Tipco.

Stearns Dealer Builds—A new salesroom for William C. Coon, dealer in Stearns and Raulang cars, is being completed at Main and Summer streets, Buffalo, N. Y. A service station is in connection with the salesrooms.

Republic Agency In Canada—The Ryan Garage in Regina, Sask., secured the local agency yesterday for Republic trucks. The Williams Motor Co., of Regina will have charge of outside distribution in this province.

Maibohm Adds Engineer to Staff—H. A. Flogaus has been appointed to the engineering staff of the Maibohm Motors Co., Sandusky, Ohio, For four years he was automotive engineer with the Willys-Overland Company at Toledo, and later was with the Curtiss Aeroplane & Motor Corp. at Buffalo, N. Y.

Move Philadelphia Office of Joseph Dixon Crucible Co.—The Joseph Dixon Crucible Co., Jersey City, N. J., manufacturers of graphite lubricants, have announced the removal of their Philadelphia sales office from 1020 Arch street to Rooms 801-802 of the Finance building, South Penn Square, Philadelphia, Pa.

Take Over Car Rebuilding—McQuillan, Bradford & Co., St. Louis, Mo., have taken over the motor car rebuilding departments of the Packard-Missouri Motor Car Co., and are now located at 4306 Forest Park Boulevard. A. C. McQuillan and W. T. Bradford of the new firm were formerly with the Packard agency.

Traffic Motor Corp. Has New Men—G. Elmo Holke, formerly assistant secretary of the National Automobile Dealers' Asso., has been appointed assistant advertising manager of the Traffic Motor Truck Corp., St. Louis, Mo. F. S. Davis, formerly with the Buick Automobile Co., and recently chief gunner's mate in the navy, has joined the office sales force of the Traffic corporation.

Brad-Ford Co., Taken Over—The Brandt-Froelich Co., Appleton, Wis., has been incorporated with an authorized capital stock of \$35,000 to take over and continue the automotive business and garage of the Brad-Ford Co., Ford and Fordson dealer, Appleton. August Brandt is chief owner of the Brandt Auto & Implement Co., Black Creek, Wis., with a number of branches, and George Froelich is manager of the garage and service station.

Grocery Store Goes to Homes of Customers—The first self-serve, operated-on-schedule, motor car grocery in the world, is operated in Dallas, Tex., by H. A. Welman, the owner. He has applied for patents and expects to sell the idea throughout the country. The body is 6 ft. wide, and 14 ft. long. Mr. Welman chose a Dodge Brothers chassis for the grocery on wheels. Business has already increased so much that he has found it necessary to order a larger body. The driver of this grocery wagon does not leave the wheel while his customers select their goods. A complete line of meats, groceries, green vegetables and everything else typical of the

grocery store is carried and the money is paid as the patrons leave the car. Thus is eliminated the terror of the high rent districts.

Sayers Six Sales Increasing—Sayers & Scovill Co., Cincinnati, Ohio, manufacturers of the Sayers Six are increasing production to keep up with the increased sales. According to reports the company has closed some deals with large distributors and production plans have been made to keep up with the increased sales.

Chain Company to Move—The Stanley Skid Chain Co., located at Boone, Iowa, will move its plant to Des Moines July I and plans to greatly increase its facilities and output. The capital stock of the company will be doubled. The company manufactures skid chains, tire carriers and valve grinders and during the past two years has had a large volume of war work.

Wayne Oil Tank Has New Service—The Wayne Oil Tank and Pump Co., Fort Wayne, Ind., has recently inaugurated a new consulting and advisory service for oil men. The function of the service is to standardize equipment, get economical operation and maintenance of equipment, design and plan buildings, ground layouts, etc. All plans, advice and other service is gratis.

New Milwaukee Chevrolet Branch—The Chevrolet Motor Co., Flint, Mich., will establish a new branch house representing an investment of \$100,000 to \$125,000 in Milwaukee, to handle the Wisconsin and upper Michigan territory, during the coming summer, according to announcement made by M. D. Douglas, manager of the Milwaukee branch. The building will be three stories high and be located along Grand avenue.

M. & S. Differential Moves Offices—The M. & S. Corp., Detroit, announces the removal of its factory and general offices from Detroit to Cleveland, Ohio. There has also been a change in the name of its product to Powrlok. W. T. Walker, formerly of the Walker-Weiss Axle Co., Flint, Mich., is now president and general manager, while L. O. Haskins is director of sales and advertising.

Dixon Crucible Elects Officers—The stockholders of the Joseph Dixon Crucible Co. held their annual and regular meeting recently and the following directors and officers were elected:

Directors: George T. Smith, William G. Bumsted, J. H. Schermerhorn, George E. Long, Edward L. Young, Harry Dailey, Robert E. Jennings. Officers: George T. Smith, president; George E. Long, vice-president; J. H. Schermerhorn, vice-president; Harry Dailey, secretary; William Koester, treasurer.

Briscoe Distributer Service Manager—L. S. Henry has been appointed manager of the service department of the Briscoe Motor Sales Co., distributors in St. Louis for the Briscoe and Liberty Motor cars. Henry formerly was with the Henry Motor Service Co., which now is the St. Louis Motor Service Co.

Milwaukee Has Aircraft Concern-The incorporation of the first formal concern to deal in aircraft was effected this week when articles were filed in behalf of George W. Browne, Aeroplane, Inc., Milwaukee, Wis. The initial capital is \$5,000. The incorporators are George W. Browne, Thomas C. Mc-Millan and Lieut. Gilles Meisenheimer. Mr. Browne is general western representative of the Curtiss Co. He is Wisconsin distributor of the Overland and Willys-Knight. The retail business in these lines is incorporated as George W. Browne, Automobiles, Inc. McMillan is secretary and treasurer of the Browne companies. Lieutenant Meisenheimer served in the Canadian Royal Flying Corps as instructor and has joined the new Browne aircraft sales company as general manager. The first demonstrating model recently was brought to Milwaukee under its own power



THREE TRUCK LOADS TO ONE TEAM—Does it pay a farmer to own a truck?
H. H. Haul, Westmoreland, N. H., says yes. He has a Federal and uses it to bring fodder from the field to the barn, where it is cut and blown up into the silo. The truck brings two and three loads as compared with one with a team

by Lieutenant Meisenheimer. A hangar is being erected on Blue Mound road, near the Milwaukee Automobile Club country place, west of Milwaukee.

New Oneida Sales Manager—H. E. Johnston has recently become assistant to the president in charge of sales, of the Oneida Motor Truck Co., Green Bay, Wis.

McIntyre Changes Location—The McIntyre Motor Products Co., Chicago, has moved into larger quarters at 5417-19 State street. This concern builds the McIntyre seven-passenger bodies for Fords.

Appoint New Representative—George W. Brooks has been appointed representative for Texas, Oklahoma, New Mexico, Kansas and Arkansas for the Hudson Motor Specialties Co., Philadelphia, Pa.

Beckett New Truck Manager—A. H. E. Beckett took charge this week of the newly organized truck department of the Western Canada Motor Car Co., Ltd., Winnipeg, handling Packard and National trucks.

New Home for St. Louis Concern—A fivestory building is to be erected on the southeast corner of Locust street and Leonard avenue, St. Louis, Mo., for the United Motors Co., sales agency of the General Motors Co., for showrooms and offices. The site has a frontage of 122 ft. 6 in. on Locust street and 100 ft. on Leonard avenue. It is announced that the total cost of the building and lot will be \$500,000.

Northwestern Battery Co., 530 Jefferson street, Milwaukee, Wis., manufacturer of storage batteries and dealer in the Willard battery, has been purchased by Michael Ert, formerly a supply and accessory dealer of Winnipeg, Man. Mr. Ert will continue the business as the Northwestern Automobile Supply Co., retaining the distributing rights to the Willard line. The repair department is being enlarged to embrace complete facilities for handling electric automotive equipment.

New Oklahoma Tire Concern—The Bear Rubber Mills, Oklahoma City, Okla., will manufacture two grades of tires shortly; first will be the Black Bear cord non-skid 6000 miles, and the White Bear, non-skid fabric 3500 miles; also the Read Bear tubes. Don E. Cameron, president, has been affiliated in the rubber business the last 20 years and has connections with the Empire Tire and Rubber Co., Goodyear, Akron, and the Hawk Eye

Tire and Rubber Co., Des Moines, Iowa. The organization figures that they will manufacture tires and tubes by October 1.

Allen Making Good Progress—It was announced by officials of the Allen Motor Co., Columbus, Ohio, which is moving its plant from Fostoria to Columbus, that such good progress is being made in equipping the Columbus plant that production will start May 20. It is expected that about 100 of the new models will be turned out by that date.

Winnipeg's Row Growing—Winnipeg's Automobile Row is rapidly adding many of the best known motor trucks to the long list of commercial cars handled in this city. One of the latest is the Bethlehem. G. A. German, Canadian sales manager of the Bethlehem Motor Co., of Canada, with headquarters at Toronto, visited the city this week and placed the distributorship for his truck* with the Cadillac Motor Sales Co., Ltd., who will have the Manitoba and Saskatchewan territory.

The Cadillac Motor Sales Co. now handles the Bethlehem, the Denby, the Dodge Brothers business car and the Stewart Bros. unit. A newly organized truck department under the management of D. Milne, will look after the needs of truck-owners from now on.

Manufacturers' Representatives Open New Office—Staff & Eckhouse, manufacturers' representative, has opened a New York office at 1834 Broadway, in charge of George E. La Vietes. The company, which began operation some months ago, now has world distribution for Beardsley never-slip valve lifters and grinders; Simplex ball thrust and roller bearings for Fords and Chevrolets; Hyway oil-less timers and oil-less front springs for Fords; W. & C. double-arm cantilever shock absorbers for Fords; pistons for Fords; and auxiliary radius rods for Fords.

The company has established connections in several cities. Charles E. Scott, formerly of the Spencer-Carroll Co., Dallas, and Campbell Wood, formerly a Red Seal battery man in Texas, are handling the lines out of Dallas as Campbell Wood & Co.; Vaughn E. Lipe, formerly with Chansler & Lyon, San Francisco, and the Automobile Supply Co., Chicago, is handling the lines with an office in San Francisco; A. H. Fraser, a specialty man, has the representation in Toronto, Winnipeg and Vancouver. Headquarters are maintained at 616 Michigan avenue, Chicago, where both the partners, J. Wadsworth Staff and Walter Eckhouse, are located.

Trom the Tour Winds Climpses at the World of Motordom

SAY Bond lasue Too Small—A group of Colorado business men recently united in a movement for a \$10,000,000 bond issue. After getting well into the campaign they discovered their chief opposition was in a general criticism because they asked for too little. The bill now before the legislature calls for \$20,000,000.

Canadian Club Plans Road Guide—The Essex County Automobile Club, Windsor, Ont., with which the Detroit Automobile Club plans to co-operate closely on touring matters, is preparing a road guide or chart of western Ontario which will be available for use within a short time. It will also contain the through routes to Buffalo, Toronto and other eastern points.

Report Shows Savings by Roads—The report of the joint congressional committee which investigated highway economics in 1914, shows that a saving of 8 cents a ton mile can be effected in transportation costs when a road is lifted from the dirt to the durable class. This does not take into account increased real estate valuations or social advantages resulting from the improvement.

Motor Car Stage In Arizona—A motor car stage line which operates over a route that is particularly severe on both cars and tires, is the one in service between Globe and Phoenix, Ariz. The country traversed is exceedingly mountainous and the roads unimproved. But it is the route which leads to the Roosevelt Dam and the stage line enjoys an extensive patronage from the numerous tourists who stop off at Phoenix to visit the famous dam and the Salt River Valley.

Tyrone to Step Up Express—Business men of Tyrone, Pa., are planning a motor express route, having Tyrone as the terminal and covering the country en route to Huntingdon and State College. The rail route over this tract is long and slow and from three to four days are consumed in the delivery of freight and express by steam line. With a motor express as planned, deliveries can be made from Tyrone to any point on the route in less than half a day. The elimination of the Tyrone transfer has made the local freight movement to points east of Tyrone



The big problem in marketing livestock is to get the stock to market in the quickest time possible to prevent loss of weight. For two years R. N. Cunningham has employed a 2-ton Federal to haul his stock from his ranch near Advance, Ind., to the Union stock yards, at Indianapolis. The 35-mile haul is made in three hours without difficulty. The truck has traveled over 50,000 miles and carried nearly three million pounds of stock. It is very doubtful indeed if stock loaded on cars at Advance would reach the stock yards within three days. This would result in shortage and subsequent logs of value. The truck, by carrying the stock in three hours, does away with loss. Mr. Cunningham and his partner, Mr. Reese, has placed another Federal in service

toward Huntingdon one of the slowest in the state, although the distance is only 20 miles.

Trucks Send Food to Lille—On a trip to Lille, France, recently, Commercial Attache Pierce C. Williams found that the city was being provisioned with food sent all the way from Paris in motor trucks.

Investigate for Good Roads—A thorough investigation into the source of transportation as a foundation for road construction in the future is urged as one of the duties of a federal highway commission to take charge of federal road expenditures.

Austria First to Agitate Clear Roads— Curiously enough, the question of removal of snow from main highways which is now being agitated, was first undertaken nationally by Austria im 1877, at which time a law was passed compelling municipalities to remove snow from state roads to keep them up for

Twelve Projects Completed—A report issued by the Bureau of Public Roads shows that up to December 18, 1918, but twelve projects embracing a mileage of 51 miles had been reported completed under the Federal aid act. The act was made effective in 1916.

Good Roads Minimize Forest Fires— National forests cannot be economically and efficiently protected against fires until they are well equipped with roads, trails, telephone lines and lookout stations, says the annual report of the Chief Forester of the U. S. Service.

Milwaukee Plant to Enlarge—The Inglis Mfg. Co., 283 Fifth Avenue, Milwaukee, Wis., manufacturer of oil tanks, pumps, gauges, etc., for garage, industrial and other purposes, has under consideration plans for a three-story factory addition. Work, however, probably will not begin until July 1.

Good Roads Increase School Attendance—A survey made by the government of the effects of good road building on school attendance in eight counties shows that before the roads were improved the average school attendance was 66 pupils to each 100 enrolled, as compared with 76 after the roads were improved.

Highway Expenditures \$300,000,000—Estimates of contemplated highway expenditures in the United States for the season of 1919 place the total at approximately \$300,000,000. Because of governmental restrictions the amount was considerably lower than this in 1918, while in 1917 it was placed at \$280,000,000.

Plan for Roads in Each State—A trunk road running north and south and another east and west will be constructed in every State in the Union if the program endorsed at a recent meeting of the highway congress is translated into law by the members of congress. These highways would be linked up from State to State in order to give the nation a complete system at Federal expense.

Coming Motor Events

MEETINGS

Hot Springs, VaAutomotive Equipment AssociationJun	e 2-6
Chicago	e 2-3
Ottawa Beach, MichSociety of Automotive EngineersJune	23-27

TRACTOR DEMONSTRATIONS

Denver, Col	Sectional Tracto	or Demonstrations.		June 8-14
Wichita, Kan	Automotive Con	nmittee of National	Implement Assn	July 14
Aberdeen, S. D	Sectional Tracto	or Demonstrations.		August 18-22
Ottawa, Ont., Canad	daInter-Provincial	Plowing Match and	Tractor Demon	October
	strations			

RACES

and the second s	RACES
Indianapolis, Ind	RACESMay 31
New York	June 14
Tacoma, Wash	July 4
Cincinnati, Ohio	July 5
	July 19
New York	July 26
Flain, III	Aug 22.23
New York	Aug. 23
Uniontown, Pa	Aug. 23 Sept. 1
New York	Sept. 20
	Oct. 1



sand they wished your market.

SPARK PLUG Always on the job

TUNGSTEN MFG. CO.

New chart of plug sizes for cars, trucks, and tractors, and sample cutout plug gladly sent to all dealers on request.

When Writing to Advertisers, Please Mention Motor Age

56



HERE'S health! Your work in the garden, in the garage, in the shop, or elsewhere, may leave your arms and hands covered with dirt and grime. When you "clean up," use Goblin Soap.

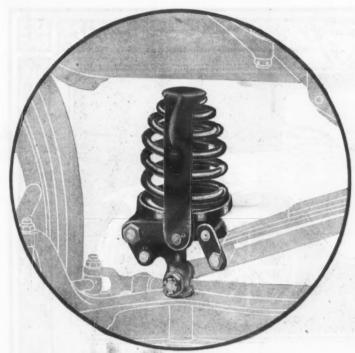
It leaves your skin clean and healthy. It dissolves the most obstinate dirt and will not injure the most delicate skin.

An all purpose soap; fine for office, garage or home. Meets all needs.

If your dealer does not have Goblin Soap, please send us his name and we will see that you are promptly supplied.

CUDAHY, 111 W. Monroe St., Chicago 64 Macauley Avenue, Toronto, Canada





FRONT VIEW

The only
SHOCK
ABSORBER
that has ever had
the capacity to
take the jolts and
jars out of
the light little
FORD

HALLADAY

Direct Suspension Shock Absorber

The tremendous capacity—the lightning action of Halladay "bee hive" springs, takes up all the jolts and jars of heavy going and absorbs the little road vibrations.

Recoil is entirely eliminated by removing that element which causes it.

Greater comfort and real saving in tires, gasoline and wear and tear with the Halladay equipped car.

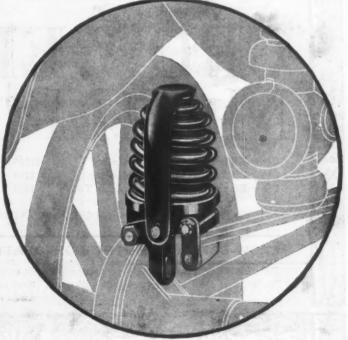
Accomplishes more in every way, than any other shock absorber ever put on a Ford car.

A postal will bring full particulars

L. P. HALLADAY CO.

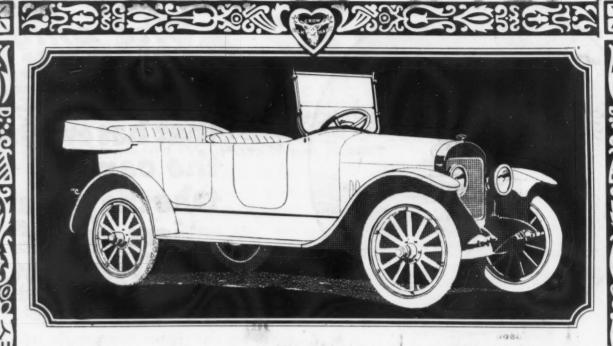
Manufacturers of

Bumpers, Shock Absorbers and Automobile Accessories
520-530 Monroe St., Streator, Illinois



REAR VIEW

When Writing to Advertisers, Please Mention Motor Age



An Easy Sure-Gripping Clutch

The self-lubricating feature of the Crow-Elkhart clutch assures maximum efficiency at all times. Large friction surfaces transmit the full power of the engine without slip or loss, and make the clutch easy to operate. Gradual engagement gives a smooth start, free from jerks or strains, while quick disengagement precludes any drag on the parts. The special Crow-Elkhart design takes all frame shock from the clutch housing.

CROW-ELKHART Multi-Powered

Crow-Elkhart Six—5 Pass. Touring\$1295 Crow-Elkhart Four—5 Pass. Touring\$1095 Crow-Elkhart Six—2 Pass. Roadster 1295 Crow-Elkhart Four—2 Pass. Roadster 1095 Crow-Elkhart Six—5 Pass. DeLuxe Tourster . 1355 Crow-Elkhart Four—5 Pass. DeLuxe 1195

WRITE FOR CATALOG CONTAINING FULL INFORMATION

CROW-ELKHART MOTOR CORPORATION, Dept. 101, ELKHART, INDIANA

DEALERS will immediately recognize the new opportunity that the Crow-Elkhart Multi-Power line offers. Desirable territory is still open. Write today for particulars about our attractive dealer franchise.

SHERRICH TO THE PROPERTY OF TH

What is Spring Service for A Nation?

ALL SPRINGS for ALL Popular Cars Always in ALL Stocks

Apperson Briscoe Buick Cadillac Chandler Chalmers Chevrolet Crow-Elkhart Detroiter Dodge Dort Elgin E. M. F. **Empire** Federal Flanders **Ford Grant Haynes Hudson Hupmobile** Interstate Mitchell Maxwell Monroe Oakland Oldsmobile Overland Page Pullman R. C. H. Regal Reo Republic Saxon Scripps-Booth Smith Form-A-Truck Studebaker Vim

The Replacement Spring

VULCAN "Spring Service for a Nation" enables Dealers everywhere to supply a spring for any car without delay.

It means:

¶ 100,000 Springs constantly in stock.

¶ Seven Distributing Branches.

¶ Over 7,000 Dealers now selling VULCANS.

¶ Demand—Sales and Profits.

Write for Dealers Proposition.

Our Own Branches
with Complete
Stocks

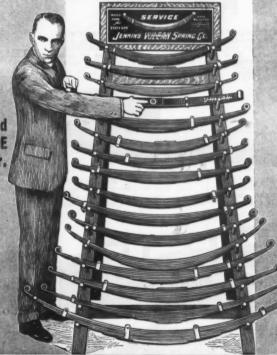
FREE

This splendid stand given FREE with first order.

at the latest

Atlanta, Ga.
Boston, Mass.
Dallas, Tex.
Minneapolis, Minn.
Reading, Pa.
Kansas City, Mo.
Sumter, S. C.

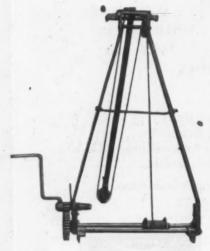
Factory RICHMOND, IND.



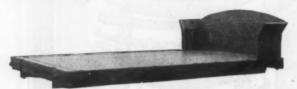
Jenkins VULCAN Spring Co.



DA B ()



The DAILEY HAND HOIST is strong, compact and efficient. It increases the capacity of a truck because it places a capable dump body at the command of the owner in addition to his regular body. This hoist occupies but 9 inches of space between the body and cab. It is easily operated and as speedy as a hydraulic hoist.



A STRONG SPACIOUS PLATFORM BODY by simply removing the sides. Little effort and but a moment's time is required to make one body from a selection of four—and a body that will competently haul almost any kind of a load.



THIS STAKE BODY is the same as the platform body with stakes 42 inches high fitted in place. One man made this stake body from the platform body in just two minutes. And he did it with his bare hands—no tools. This all-purpose body and hoist costs the same as a one-purpose body.



A TYPICAL EXPRESS BODY in a jiffy, made to fit any size or make of chassis from 1 to 3½ tons double-acting tail gate, hinged at bottom—the same in every respect as many specially mounted bodies and better than most.



AS A DUMP BODY the Dailey 4-in-1 is as sturdy and capable as any steel or specially made body. The double-acting tail gate hinged at top. One man dumps a full load in half a minute as easily as he turns a windlass. The Dailey hand hoist occupies but 9 inches when the body is down.



Showing complete equipment of Dailey 4-in-1 Bodies as applied to a motor truck. The wide utility and low price of Dailey Bodies gives the truck dealer an unthought-of opportunity for big profits and new business.

A Full Stock of Dailey 4-in-1 Bodies Carried by These Distributors:

AUTO HOIST & BODY COMPANY, 18 Bainbridge Street, Brooklyn, N. Y.

SIMPLEX BODY CO., 140 Rhode Island Street, Buffalo, N. Y.

THE TRUCK ENGINEERING CO., East 71st St. and Broadway, Cleveland, Ohio.

SIMPLEX MFG. CO., Conneautville, Pa.
THE JOHN IMMEL & SONS CO., Columbus, O.
HYDRAULIC HOIST MFG. CO., 715 Lorraine
Avenue, Detroit, Mich.

AUTO HOIST & BODY CO., 333 Avenue B, New York City, N. Y. TROY TRAILER CO., 5 North 21st Street, Philadelphia, Pa.

THOMAS & COMPANY, Braddock Avenue, near Forbes Street, Pittsburgh, Pa.

AUTO TRUCK STEEL & WOOD BODY CO., Frisco Building, St. Louis, Mo.

When Writing to Advertisers, Please Mention Motor Age

ILEY DIES

THO MASS COMPANIE

APRIL 22, 1919.

This is but one of the many letters we have received telling of successes selling Dailey Bodies.

Note paragraph No. 3

Dailey Bodies make big profits for you and for your customers. After you sell one Dailey Body, other sales naturally follow.

Read the opposite page—then write for dealer offer. Get your share of the big profits that are being made by Dailey dealers.

H. R. DAILEY

U. S. Sales Agent Auto Truck Steel Body Co.

Carroll Ave. and Sacramento Blvd.
CHICAGO

Dailey Bodies Are Made by the SIMPLEX MFG. COMPANY, Conneautville, Penn.

When Writing to Advertisers, Please Mention Motor Age

WITE ME

Cordially yours.

Let the House of Gibson Fill Your Orders Complete

THE Gibson stock is so large and Gibson prices so attractive that you can send us your orders for practically everything you need in the automotive line and have them filled complete. The many inconveniences of dividing your purchases between several concerns is avoided.

Automotive Supplies and Equipment

Only goods of proved reputation and merit are carried. We make our own tests on every item before putting it in stock. Gibson approval is your assurance of quality and salability.

We carry in stock all standard supplies and parts for motor cars, trucks, tractors, marine engines, internal combustion motors, shop equipment, electrical supplies—everything in fact from spark plugs to tires, from wrenches to garage machinery

—ready to ship anywhere on receipt of your order.

Twenty-one years of experience in the automotive business and more than \$7,000,000 in resources insure the high-quality and stability of Gibson Service.



How Uninterrupted Transportation Came To Industrial America

By George A. Kissel

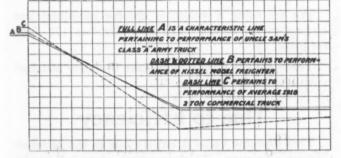
What Uncle Sam Has Taught Us

"Saw a Kissel-built truck at the front and it's a bear," wrote a Kissel soldier boy with the American E. F. last Fall, boy with the American E. F. last Fall, and we here at the factory breathed a sigh of relief for up to that time we had wondered if the 24 hour pace we had maintained was giving results "Over There." For over a year we were a part of the most highly specialized and "efficiencyized" manufacturing organization that human ingenuity and money could perfect. Every man in our organization went through a most gruelling training course in his particular work—building to U. S. War Specifications—the most minute, strict and accurate measurements minute, strict and accurate measurements

the greatest importance to properly se-lect and combine the factors which gov-ern the design properly; second—that with the apacity of the vehicle deter-mined, the most important factors to be considered are the total weight of the truck, motor size, motor speed, rear axle ratio, tire size, speed of the vehicle and low gear ratio in the transmission; third that only the proper selection and combination of these factors in any size truck and for any line of business will give the owner the results he looks for and which are-well balanced power transmission from motor to rear tires-good performance ability on levels and grades and low fuel consumption. These are the de-

termining factors that have always guided Kissel in producing Kissel motor

trucks.



Performance chart shows how a Kissel "Freighter" truck compares with the new type "A" U. S. Army truck after comparison of sizes, gear ratios and other units, was made.

in the world. This "toeing the mark" un- est engineers to design a trouble-proof der a veritable military regime made dif-ferent men of us—we became experts—a highly specialized organization-

And then November 11th dawned—the armistice was signed—the war was over! Since that day we have been gradually

getting back to peace-time work-and it s with the same spirit of enthusiasm, knowledge and co-operation that characterized our "Building to U. S. War Specifications" that we now are "Building to U. S. Re-adjustment Specifications."

Building to Business Specifications

The business men of the United States have before them one of the greatest and gravest problems of the age—the hercu-lean task of not only feeding and cloth-ing at least one-half the population of Europe, but producing and delivering an endless variety of supplies, materials and equipment necessary to build up the millions of acres of devastated land and the thousands of destroyed towns.

In short—while in war time Production was the question of the day—in peace time Distribution is the problem of the day-with the motor truck as the logical solution.

Transportation delays must be elim-inated—shipping efficiency must be in-creased—an endless chain must connect the source of demand with the source of supply.

Determining Factors

Every business man who understands what a motor truck should do under arying conditions knows that first-to produce a well performing truck, it is of

Analyzing the Results

On account of its adaptability to practically every requirement, the two-ton truck is the popular capacity.
When Uncle Sam

was designing his type "A" Army truck he mobilized the Nation's great-

two-ton truck of unusual ability for mili-

tary service.

At the same time the Kissel engineers had been developing a highly perfected truck of the same capacity and qualifications for commercial use.

When the motor sizes, gear ratios-in fact the whole power transmission from motor to rear tires—were compared, it was found that these factors were almost was found that these factors were almost identical in both jobs, resulting in the Kissel Freighter more closely equaling the power, economy, hill-climbing and heavy road-pulling ability of Uncle Sam's truck than any other truck of like ca-

Thus by carefully studying conditions at a time when truck performance was a vital necessity to the business world, the Kissel "Freighter"was so designed that it is a truck satisfactory in fuel con-

sumption. showing great ability on level roads and grades, and well performing

in every line of haulage work.

The "General Utility" has a chassis capacity including capacity including body of 4,000 lbs.— the "Heavy Duty" with a chassis capacity including body of 8,600 lbs.—the "Goliath," a giant in strength and

body of 11,800 lbs. In addition, by June 1st Kissel will produce the new "General Delivery"

truck, designed to meet the many urgent requests of present Kissel owners for a to 1-ton delivery truck to sell at a price that is moderate, but consistent

with highest quality.

Among the many structural and mechanical Kissel truck features are—the powerful Kissel-built engine, designed and built at the Kissel factories for motor truck power purposes; amid-ship transmission on the "Freighter." "Heavy Duty" and "Goliath," eliminating a long propeller shaft and the possibility of whipping; rear axles of the most perfected type of worm-drive construction; frame of pressed steel, subjected to spe-

cial tests and counter-tests for enduring strength and rigidity of construction; radiators of cast iron, rigidly constructed with ample cooling capacity. And so on-Result—perfectly balanced trucks—weight, size, dimensions, power, all related to one another in exact harmonygiving an incomparable chassis of per-

fectly balanced moving and fixed units, headlined by the powerful Kissel-built engine—trucks in which the haulage and delivery requirements of over 200 differ-ent lines of business are built-in at the beginning-that maintain schedules because they are built to overcome obsta-

cles unsurmountable with trucks of less development and experience.

The ALL-YEAR Cab

The necessity for uninterrupted transportation throughout the winter months prompted Kissel to originate the ALL-YEAR Cab—that protects truck drivers in wet and stormy weather-increases efficiency of the driver-and keeps trucks in operation the year round. In winter it is entirely closed. In summer, by re-

moving the winter attachments, it becomes a cool, open housing.

Never before have the dependability, adaptability and economy of motor truck transportation become such a national business necessity as today. The unusual days ahead make it imperative for every business man—every manufacturing and industrial executive—to realize the vital importance of choosing the right make of trucks—which is the moral of this story. Such men should have the 1919 Kissel Truck Catalogue, showing how Kissel Trucks will fit their individual re-

Kissel Trucks are sold in all principal



power, with a chassis capacity including cities, where specifications and catalogue may be received, or direct from factory.
KISSEL MOTOR CAR CO., Hartford, New Kitchell Sixes

New Victory Model New in 100 Ways

The Mitchell Price

The new Mitchell Six somewhat undersells any car of like size, power and class. But the added values are what make this price amazing.

This Victory Model embodies more than 100 improvements. Many are costly improvements. Together they show 50 per cent added strength and 75 per cent more endurance.

Rear axle strength is increased 50 per cent. Frame strength is increased 50 per cent by adding 1½ inch depth. Brake efficiency is increased 75 per cent.

We have added strength to the crank shaft, to the gears, to the steering gear, to the transmission. We have added a new disc clutch.

Part by part, in the past two years, we have worked out higher standards. We have studied the records of tens of thousands of Sixes, and have tried to correct every deficiency.

New Body Standards

We get staunchness in our body frames by using material which costs twice the usual. We are using a new-grade top—a top which keeps its newness. We employ twice the usual varnish coats to secure enduring luster.

A thermostat controls the temperature of liquids, air and gas. The carburetor intake is twice-better heated to secure complete combustion. These features, with improvements in our motor, have vastly reduced the operating cost.

Factory Standards

We have spent \$250,000 for new machinery and equipment for bringing out this model. We have adopted the exacting methods for inspections and tests which the Government installed here on trucks.

A very large staff of trained inspectors watches

this new car from beginning to end. Many new testing machines are employed. Two new-type balancing machines are used to balance crank shafts.

We are using a wealth of chrome-vanadium and chrome-nickel steels. The new Six has 123 drop forgings.

These are the facts which make this new Mitchell such a sensational value.

Due to Efficiency

This supreme value is largely due to the Mitchell factory efficiency. This mammoth plant is a model plant, where every process is conducted by scientific cost-reducing methods.

We build the complete car — motor, chassis and body — at the lowest cost attainable in a car of the Mitchell grade.

But this model, in addition, is priced uniquely low. We have pared our profits to the limit. That seems to us the spirit of the times—to bring all industry back to normal.

The success of this new Mitchell is tremendous. The slightest comparison reveals its supremacy. And every car which goes out will build good-will for Mitchells.

We want to hear from dealers who feel that facts of this kind promise a great future.

5-Passenger Touring Car \$1475 f. o. b. Racine

120-Inch Wheelbase — 40 Horsepower Motor
3-Passenger Roadster, same price
New-Type Touring Sedan, \$2175

7-Passenger Touring Car 127-Inch Wheelbase — 48 Horsepower Motor \$1675 f. o. b. Racine

735



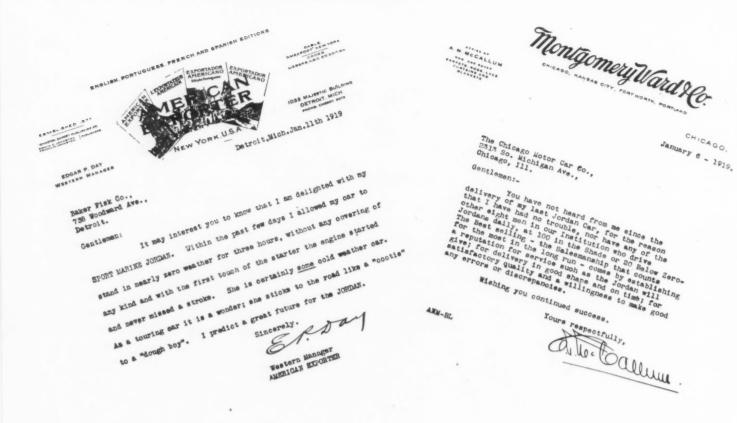
Sixty Striking. Stories Satisfaction

First Series

I F A MAN decides to paint a picture, write a book, make a pair of shoes, or build a motor car, and he determines to put into that product of his own brain the best that he has within him, that creation will possess a certain quality of goodness — an expression of his own sincerity, which will command attention, create desire, and secure the approval of people who know what they want

Edward D. Jordan

The Jordan Motor Car Company Cleveland, Ohio



THE STANDARD CAR WHEEL COMPANY

MANUFACTURERS OF RAILROAD AND ELECTRIC CAR WHEELS

CLEVELAND, OHIO January 6th, 1919.

Tronas & Pago, Frast Galon A Parkor, Troas Trank W Bago, Sazu

Parker & Page Company

Dealors on

Hardwood Lumber

Mardwood Sirst Gires

East Cambridge, Mass, Junuary 9 th, 1919

The Jordan Ohio Cumpuny, Euclid Avenue, Cleveland, Ohio.

Gentlemen:-

It gives me great pleasure

to state that my 1917 Jordan touring car has given me very good satisfaction indeed, and I would not hesitate to recommend it to any of my friends as a mighty reliable machine.

I also desire to add that

" Jordan Service " is very real and has been greatly appreciated by me.

With test wishes for a

prosperous 1919, I am

Yours very truly,

Callington

87 Eassachusets Ave., Boston, Eass.

Hincholiffe Lotor Co.,

Attention of Lr. Hinchcliffe

Gentiene

The Jordan car that I purchased from you was very satisfactory; so much so that I recommended your car to my son, who purchased two cars with good results. I also found your service during these strenuous times, to be very satisfactory.

Yours respectfully,

Francis & Page



OSEDALE 346-J CENTRAL 5898-F THE HOME OF SQUARE DEALING

Carlo Aulce

HULCE'S UNDERWEAR STORE

AND HOSIERY SHOP

317 ADAMS STREET TOLEDO, O.

The Barger Nitchell Motor Co., 1214-16 Madison Ave., City.

SEND US YOUR MAIL ORDERS LADIES', MEN'S, CHILDREN'S UNDERWEAR, HOSIERY, KNIT GOODS

A SPECIALTY MEN'S NIGHT SHIRTS AND PAJAMAS

LONG DISTANCE PHONES OHIO STATE OF BELL MAIN 899

ALSO RESIDENCE

Gentlemen:

I feel that you should knew how fully satisfied I am with my new Jordan sedan purchased three months ago.

Although we purchased it for city use we recently returned from a 300 mile cross country trip in the reain without a mishap which in addition to nearly 4,000 miles of city driving proves to me that a sedan of proper construction, such as the Jordan has preven to be, is the ideal car, not only for all ecasens but for all kinds of driving. You will be interested to know that we are averaging 15 miles to the gallon which is more than you promised.

I also want to express my appreciation of the interest and courtesy shown me when I have had the car in for inspection. This together with the value preduced in the Jordan should make you feel free to refer any prospective buyer to any Jordan owner.

You may feel privileged to use me as such at any time.

With complete satisfaction, Carl a. Hulce.

RAH-WR

January 7th, 1919.

The Jordan Chio Company, 4500 Euclid Ave

City.

Attention, Mr. O. C. Tyner.

HOME PIANO CO.

108 EUCLID AVENUE CLEVELAND

Dear Sir:

It is a pleasure for me to recommend the Jordan Car. After making over ten thousand miles in my Suburban Touring, I have had sufficient occasion to put it to the test from every standpoint, and have found it to be entirely dependable. I couldn't expect an easier riding car, nor a smoother quieter running motor, and for sconomy. I could match my low upkeep with many a car fully one third less in price.

Am still using two of the original tires, and my mileage all summer was never less than fourteen and often seventeen miles to the gallon. During this cold weather I am getting thirteen. For a car of this size and power, I consider it remarkable. I have found no weak spots in it anywhere, and feel it is due you to say that I can be referred to any time by you to any of your buyers who want a user's opinion of your car.

Yours very truly sty,
M. O. Mattle

PURNITURE, CARPETS

THE JAMES ELLIS COMPANY 145 BROADWAY

Boissevain & Co. 24 Broad Street, New York,

December 9th. 1918

SOUTH BOSTON, Jan. 14. 1919.

The Hinchcliffe Motor Company, 97 Massachusetts Avenue, Boston, Massachusette. Centlemen: -

I wish to say a word regarding the satisfaction I have had from the use of the Jordan Car, I purchased from you two seasons ago. The remarkable comfort one gets from riding in it is a real pleasure, and the upkeep has been reduced to practically nothing. Regarding my motor, I have said many times that as far as trouble goes, I never knew I had a motor, in fact all the trouble I have had with previous cars seems to be eliminated in the Jordan. I am looking forward for the new models and you may be sure nothing would induce me to change.

very truly yours,

Chas. a. Cutas

McCurdy-Brainard Co., Inc., Broadway at 63rd Street, Broadway at 63: New York City.

With respect to your letter concerning the Jordan car, beg to say that my "Jordan", which I purchased last June, has been a pleasure. Its riding and driving qualities, like its construction and finish, are exceptionally good.

> Briefly - I find it a most satisfactory car. Cordially yours,

RWW/CM

Uppor hordclave

1919.

, 1919



McCurdy-Prainard Co., 717 N. Broad St., philadelphia, Pa.

Gentlemen:

Marris Brenner Johner in Wall Paper 526 1s 536 8. Twenty-Berond 81.

Gentlemen:

I have driven one of your JORDAN touring cars
I have driven one of your JORDAN touring cars
with its performance.

In the 20 months that I nave had the car, it in the 20 months that I nave had the car, it has been on the street practically every day, rain has been on the sand has never flinched.

In the 20 months that I nave had the car, it not street practically every day, and has been on the sand has never flinched.

In the 20 months that I nave had the car, it not street practically every day, and sense of the practically every day, and the car is a street practically every flinched that the car is a street practically every flinched that the car is a street practically every flinched that the car is a street practically every flinched that the car is a street practically every flinched that it is a street practically every flinched that I nave had the car, it is a street practically every day.

Philadelphia .- January 14, 1919. 191

The Mather Spring Company

Automobile Springs

Toledo O.U.S.A.

January 3, 1919

The Barger Mitchell Motor Company, Toledo, Ohio. Gentlemen: ~

of the Jordan car after having driven my Sport Marine since early April. I have ing driven my Sport Marine thousand miles, need any kinds. It is powerful, and have had no fellows, and free of vibration or notes as even makers of the Jordan car are a high grade bunch of fellows, and their product reflects the spirit of the Jordan car are a high grade bunch of the spirit of the s

Here's hoping that you will double your sales in

The kind and courteous treatment and fair dealing toward me at your service station has always been apprecisted. With hopes for a continued success of the JORDAN, I remain

very truly yours,

(leveland. Jan. 14, 1919

Jordan Ohio Motor Car Co., E. 45 Euclid Ave., City Attn. of O. C. Tyner

Gentlemen:

I have driven a Jordan Car for one year and three months, and have found more pleasure in riding in same than in any car I ever owned or have ridden in. I have had little or no trouble with my car since I purchased it, and I cannot let this occasion go by without calling attention to the excellent writes that I received at the hand of your Mr. Typer and the Jordan Co. All I can say is, that I hope that any one wishing a good car, and good service will buy a Jordan Car by all means.

Yours very truly,

By Foul H

ROBERT T. SMALTZ Catior and Imported

RUNYON & AUTENRIETH

COUNSELORS AT LAV

JOS F. AUTENRICTH EDMUJD & JOHNSON

December 9th, 1918

Broadway at 63rd Street, New York City.

Gentlemen:

Relative to the recent purchase made by me of a Jordan Sport Model car, I beg to advise you that up to the present time it has given all the service that a most satisfactory car could give. Of course I had been familiar with the car sometime prior to my purchasing it, and knew that it was a "real car" and am glad to give my he artly endovsement of the car to and shall in the future, as I have in the past, be pleased to recommend it to any one.

Joseph F. auterently

Barger-Nitchell Motor Co. Toledo, Ohio. Gentlemen:-

Jan. 6, 1919.

Regarding the Jordan car wish to say that I have had more compliments on same than any other car I have ever driven. And believe me the car is as good as it looks, never gives me any trouble and is very satisfactory. "Roll Jordan Roll" With best wishes and success to the Jorden.

Very truly yours,

W. A. PEARNE
INVESTMENTS
ROCKSPRILER STLEME
CLEVELAND

January 6,1919.

Mr. O. C. Tyner, Manager, The Jordan Onio Co., Cleveland, 0.

In answer to your inquiry of recent date as to the condition and service of my Jordan Suburban; I take pleasure in seying that it is in first-class shape. I take pleasure in seying that it is my second Jordan; my first Jordan touring car I This is my second Jordan; my first Jordan touring that was never in drove over 20,000 miles and to my knowledge it was never the repair shop but once and that was due to an accident. Dear Mr. Tyner:

borhood of 15,000 miles without any trouble whatsoever, excepting just recently when I had a collision which damped the front of the car. I think this epeaks for itself as to the front of the car. I think this epeaks for itself as to the service I am getting from the Jordan cars. I might add the service I am getting from the Jordan cars and the service I have driven automobiles of different makes since that I have driven a car that has given me as good land have never driven a car that has given me as good extisfaction as the Jordan has.

I with to take this opportunity in thanking you personally, as well as your organization, for the excellent service which I have received at your service existent on in taking your frankly say that it has been the best service mybody every frankly say that it has been the best service mybody care for possibly dream of. Your promot attention in taking could ever possibly dream of. Your promot attention in taking could ever possibly dream of. Trusting that you have the greatest year in your history in 1919, I beg to remain

Malegran

CHARLES M. HARPSTER, PH. G., M. D., F. A. C. S.

301-315 WEDGEWOOD BUILDING
COR ADAMS AND ST. CLAIR STREETS

TOLEDO, O

SIDNEY G. MATTHEWS PHILADELPHIA

January 10, 1919

Mc Curdy-Brainard Company, 717 N. Broad Street, Philadelphia, Pa. Gentlemen: -

The writer has been driving a Suburban Seven Passenger Jordan Car for some time using cord tires, which were used 12,000 miles without replacing, have experienced very little mechanical trouble during this time, and have had prompt, efficient and satisfactory service station work at all times.

The writer thinks the "Jordan " one of the best cars procurable.

Laury Elletheur

Barger-Mitchell Co., Toledo, Ohio.

Dear Sirs:

I am more than pleased to add in my small way my praise for the Jordan Car. I have used my Jordan Sedan for about one year, and have perfect satisfaction from same. I have owned many automobiles, but the Jordan is a perfect motor and car.

Yours most sincerely.

Dr. Constarpeter.



NEW CHEBOYGAN HOTEL

CHEBOYGAN MICHIGAN Jan'y 23rd, 1919.

L. J. REUTER CO. Plantemen

PO WAVERLEY OAKS ROAD
WALTHAM, MASS.
January 5, 1919.

Bakar-Fisk-Hugill Co., Detroit, Mich.

Cantleman:

I have driven a Seven Passenger Jordan for two years. and although I have owned a number of other cars, My Jordan has been the most satisfactory of any car I ever owned. My complete satisfaction is evidenced by my recent purchase of another Jordan, a Four Passenger Sport Model. Although we have a lot of poor roads in this part of the State, my Jordan has stood up under all kinds of roads or weather conditions.

The Hinsheliffe Motor Company, 87-89-91 Massachusetts Avenue. Boston, Mass.

LJR/A

I have gone through just two years of service from the Jordan car, and all of that two years has been for the Jordan good hard work. My car has not been humored or babied in any way, and it has stood up under hard usage in fine shape.

One point that appeals to me especially is that the motor keeps so cleam. I have not been any more careful than the average as to cil, either quality or quantity, but in about 26,000 miles the motor was cleaned only once, and not once has there been a spark plug changed.

If I were in position to change my car for a new one I would like to have another Jordan. The good treatment I have had from your company, both in the office and service station, is worth a great deal to the owner of any car.

Now that the war is over and conditions are straight-ening out, I hope that you will have a prosperous year.

With all good wishes, I am,

Yours very truly, Cours of Renter



Sem De Amour

Policit W. Bull Arthur B. Lytton

LAW OFFICES
BULL, LYTTON & OLSON
THE ROSSERY
CHICAGO

January 3, 1919,

F. LEVY WHOLESALE SHOES 1413 WASHINGTON AVENUE SAINT LOUIS MISSOURI

Jan, 17, 1919

St. Louis Motor Car Co., 8126 Locust St. St. Louis, Mo.

Relative to your inquiry of the list Relative to your inc Gentlemen:

I consider it an honor in having the first Jordan Sedan in the city of St. Louis, and can fully recommend it as a car of and can fully recommend it as a car of exceptional qualities. The roughest roads are like boulevards The roughest roads are like boulevards state of the roughest roads are like boulevards and shifting gears and shifting through the orowded thoroughfares, as it will go the orowded the walk in high speed. exceptional qualities. Having such satisfaction from the Sedan,

Having such satisfaction from the Se

I have already purchased a products to all my
fully recommend the Jordan products
friends.

Thanking you for the opportunity of the car, and wishing expressing my feelings I am expressing my auccess, I am friends.

Um B. Lewy

THE HENRY LIBBE STONE & COAL YARD

OFFICE AND YARD 1021-1039 CHAMPLAIN STREET

HOME PHONE, MAIN SIS

TOLEDO, OHIO. . Jan. 7, 1919. 191. __

Barger-Mitchell Motor Co., Teledo, -O.

Gentlemen:

I am pleased to express my opinion on the "Jordan Six", seven passenger oar. It has exmeeded our expectations. We have run nearly sight thousand miles and have experienced practically no engine trouble. Without having cleaned any spark plugs or walves the engine runs as well now as when the car was now. And as to appearance, we have yet to find a car of its class that will match it in beauty.

Summing every thing in connection with the "Jordan Six, we can say "That we are well pleased."

John N. Libbe

Chicago Motor Car Company, 2313 So. Michigan Chicago.

Gentlemen:

My new Jordan Sedan is a regular Jordan job but the most handsome in appearance of any of them. You know its the third Jordan I have owned and with that and my four passenger Jordan sport roadster I claim no one could have a better equipment. In over 40,000 miles of Jordan driving I have never had any motor trouble and I am sure there is no easier riding car. The new car is running as well as any of its predecessors. That's good enough for me.

Very truly yours.

TWR-T ..

SEARS, ROEBUCK AND CO.

CHICAGO

Chicago Motor Car Co., 2313 Michigan Ave., Chicago.

Mr. O.G. Heffinger, President.

Dear Mr. Heffinger: -

About a month after I bought a Jordan Limousine from you in November, 1917, you asked me what I thought of the car and I told you it was "all right as far as it had gone".

Now, more than a year later with fifteen thousand additional miles to its credit I am glad to be able to tell you the car is still "all right" - absolutely so. The criginal sir is still in the tires and we have had no mechanical trouble of any kind at any time although the car has been in use every day including all of the blizzard period of January, 1918.

Not taking into consideration cheaper cars, I have owned two machines slightly higher priced and one about double the price of the Jordan and for dependability, comfort, beauty and general use I would not trade the Jordan for any two of the lot.

I expect about forty thousand miles from any car and in a little more than a year from now, when my present car has delivered that mileage. I shall be glad to see you in regard to a new machine of the same general type because, as before said, I cannot find anything more entirely satisfactory at any price.

Very sincerely yours,



INTERNATIONAL LIFE INSURANCE COMPANY,

January 18th, 1919

Mr. John Boe, President, St. Louis Motor Car Company, St. Louis, Missouri

Dear Sir:-

I am in receipt of your letter of the 15th, asking if the Jordan Brougham which I purchased in October 1918 is entirely satisfactory. Replying will say that the car has met every expectation, and in fact is a wonderfully satisfactory car. Prior to the purchase of the Jordan Brougham, I had used a number of high-class cars, but none of them has given me the service and satisfaction that this

The best evidence of my faith in the Jordan Brougham is that about ten days ago I gave you an order for one has. a Jordan Sport Marine to be delivered on the first of March, 1919.

Yours very truly,

JLB: LR

A. D. GATES CONSTRUCTION CO., INC. **ENGINEERS**

> PLAIN AND RE-INFORCED CONCRETE 814 CHEMICAL BUILDING

> > ST. LOUIS, January 14, 1919

St. Louis Motor Car Co., 3126 Locust St. St. Louis, Mo.

Gentlemen: --

Referring to yours of the 11th inst. desiring an expression from me as to the performance of my seven passenger Jordan, would state that I have been agreeably surprised in the performance of this car. It rides very nicely over the roughest of roads, has more power than I have ever found necessary to use and it is seldom necessary to shift gears either in traffic or hills and it is very easy to operate.

If your prospective customers only knew the pleasure and satisfaction that the Jordan gives they would not hesitate to purchase. one.

Trusting that you may increase your Jordan sales.

Yours very truly,

adjutis

MARTIN HAYS COUNSELLOR AT LAW IS TREMONT STREET, BOSTON TELEPHONE MAIN 158

January 32, 1919.

Hincheliffe Motor Co., 91 Mass. Ave., Boston, Mass.

Dear Sira:

I have driven a seven passenger Jordan car since March 1917. I have found it easy running and confortable, as economical to operate as could be expected for a car of its size and considering the large mileage the repairs have been less than should be expected for the distance travelled. The car is not hard on tires and the consumption of gasoline and oil is moderate. I cheerfully recommend the Jordan car.

John H. Young WEST TWENTY-NINTH STREET

New York City, December 3rd, 1918

Malin Hays.

McCurdy-Brainard Co., Inc. Bway at 63rd St. New York City.

Gentlemen:

I cannot any enough good about your Jordan, and Sunday last after a years ownership, it ran charmingly for two hundred and ten miles.

Best wishes from Very truly yours.

The Ohio Injector Company of Illinois 1437 Monadnock Block Jan. 10, 1917. Chicago

Chicago Motor Car Co., 2313 So. Michigan Ave., Chicago, Illa.

A little over two years ago I purchased from you a Jordan war, becoming one of the first Jordan owners in Gentlemen: Chicago. At that time I was asked why I had purchased a car that WAB 80 New to the Automobile Trade when there were so many other cars of long standing reputation on the market. My reply was that I purchased the Jordan car because it was assembled with exactly the units I would have specified had I been designing the car, and therefore, it met my idea of It is a great pleasure for me to advise you at what was desirable in a good car. this date that my experience with the Jordan car has proven

the soundness of my judgment at that time, for my car has been more than satisfactory. It has been a real pleasure Wishing you every nuccess, I am to own and drive it. yery William Sfary

WSF.KD

E W HOLTORES CAN

MERRITT W RATHUE ABET CASHIEF FERD G. CHRISTGAU, 4887 SECTION

ARTHUR G RATHUE, Secretary

CHICAGO CITY BANK ** TRUST COMPANY

CAPITAL \$ 500.000.

SURPLUS \$ 500,000

6233 - 6235 SOUTH HALSTED ST.

CHICAGO, January

Chicago Motor Car Co. 2313 S. Michigan Ave., Chicago, Ill.

7 passenger touring car, and am writing you thinking that you might said period.

About six months ago I purchased from you a "Jordan 60" said period.

About six months ago I purchased from you a "Jordan 60" said period.

During the six months' driving the only tools which I has made the trip through the sands of Wisconsin and Minnesota and is running better today than the day I purchased it. During that the properties of the properties of the month of the man the say I purchased it. During that of them on high speed.

commend the car to any Frospective Furchaser. A few of my friends, and would re-knowing that I had purchased a "Jordan", inquired from me as to the record of my car, and I am wery gratified to say that the majority of them are now the proud possessors of a "Jordan" themselves.

highly upon the treatment and service received from your Company, to remain

Respectfully yours,

ACR: C

archer D. Rachye

BOSTON, January 14th, 1919.

D E SPAULDING VICE-PRES E WALDO REED TREAS

NELSON VALVE COMPANY BRONZE IRON, AND, STEEL VALVES

BRANCH OFFICES



CHESTNUT HILL

PHILADELPHIA January 6, 1919.

McCurdy-Brainard Co., 717 N. Broad Street, Philadelphia, Pa.

It is now about three months ago since I purchased from you one of your Sport Marine Model Cars, and to date I have driven it about 2500 miles and I have not had the least particle of trouble what-so-

It has been a pleasure to drive the car, both from the standpoint of appearance and the ease in which it is driven.

You have power galore, and I do not think there is a better motor in any car on the market today.

I want to expressto you the appreciation of the little courtesies you have extended in making minor adjustments, and in every respect the car has given absolute satisfaction.

THE SUBJECT TO CHANGE WITHOUT MOTICE CONTRACTS ACCEPTED SUBJECT TO FIRES, STRIKES, ACCIDENTS, OR OTHER CAUSES BEYOND OUT

Yours very truly

R. Sw. Ward

RGW /MHP .

The Hinchcliffe Motor Company, 91 Massachusetts Ave.. Boston, Mass.

Gentlemen:

In my opinion & car should possess certain features to make its ownership a joy - Power, speed. easy riding qualities, durability, economy and, last but not least, beauty.

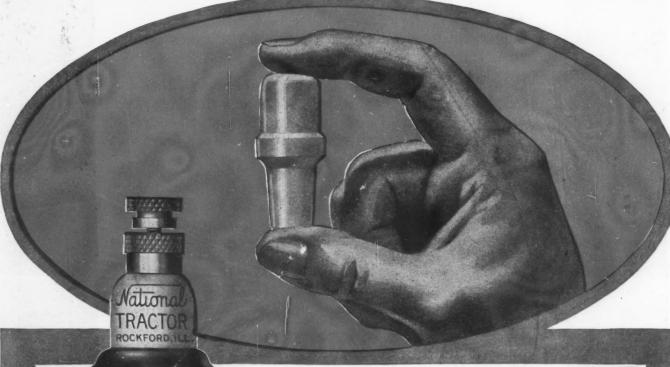
The two Jordan cars I purchased from you have filled every one of these requirements. I have owned other makes of cars but never before got such satisfactory service as I have out of my Jordans.

Wishing you every success, I am

Very truly yours.

Dana E. Spendang

Cational BIG POWER SPARK PLUG





Prices: Standard sizes for automobiles, etc., \$1 each; Tractor Special, \$2 each.

Tractor Special Big Stone Insulator

Practically unbreakable — heat-proof — oil-proof — trouble-proof—compression-tight. Equipped with BIG Power—over-size electrodes of extra heavy wire—designed specially to ignite low grade oils that have a tendency to slow, lazy ignition.

The NATIONAL Tractor Special—designed to meet the requirements of tractors and high-compression stationary engines—is a BIG Power, sturdy, oversize, dependable plug that stands up under heavy-duty requirements and is unequaled for durability, steady service and economy of fuel.

NATIONAL Spark Plugs are made in all sizes—to fit any motor—for every requirement of air, land and water service. Every plug is assembled by hand, carefully inspected and rigidly tested.

Ask your dealer or write for Descriptive Booklet

Bergie National Spark Plug Co., 315 E. State St., Rockford, Ill.

New York Pittsburgh Atlanta San Francisco Dallas Tulsa, Okla.

Export Department: WERNER & BUTTS, 336 Whitehall Bldg., New York, U. S. A.

Standing sentry over your own investment and the good will of your customers, it is your right as a dealer to challenge us and our product—AC Spark Plugs—before you buy.

These, undoubtedly, are some of the questions you want to ask:

Who are you? How long have you been in business? Are you going to be in business next year? Is there a demand established for your product? Are you keeping this demand alive by maintaining quality?

We welcome such a searching analysis on the part of jobbers and dealers, because we are in a position to make positive and convincing answers.

We are a stable, prosperous and resourceful company. Behind us are *many* years of successful endeavor. The future is rich in promise for us and those dealers who have or may affiliate with us.

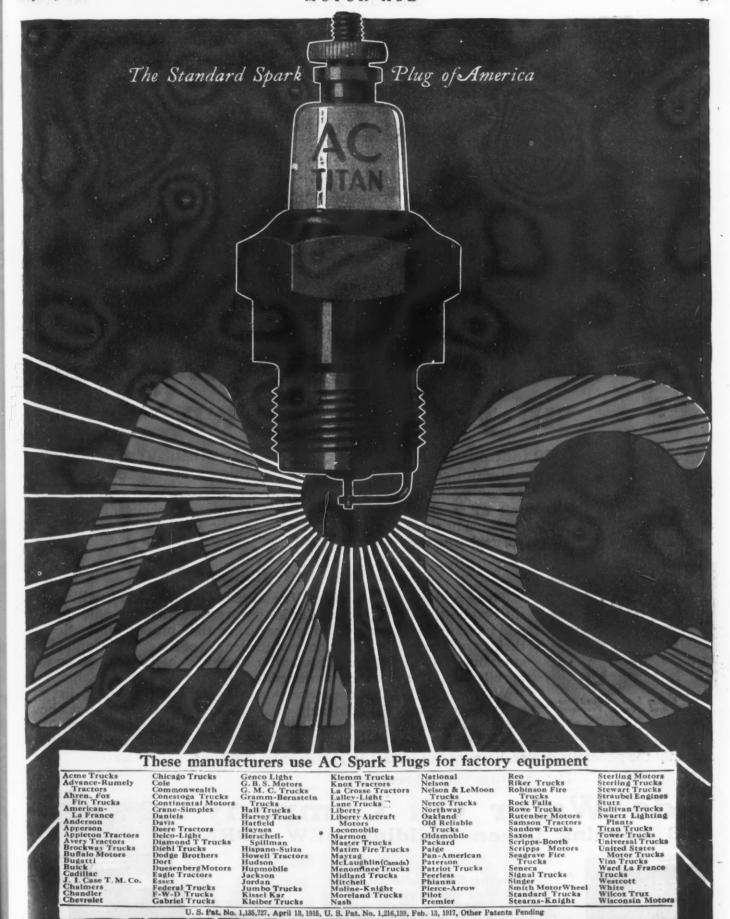
In AC Spark Plugs, we have a quality product, bought by thousands and thousands of automobile owners, used as standard equipment on most makes of fine passenger cars and established trucks, and selected by government aviation engineers for sparking the Liberty and Hispano-Suiza airplane motors.

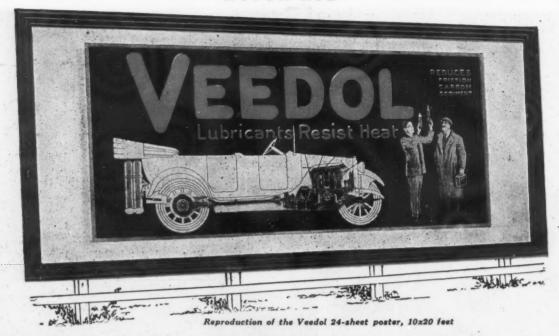
And AC quality is maintained by expert design, constant experimentation, scientific development, skilled manufacture and careful inspection.

AC Spark Plugs are made for unfailing service. That they fulfill this contract is the testimony of every AC user. That means that there is a tremendous and ever-growing demand for them by which you can profit by stocking the complete AC line.

Champion Ignition Company, FLINT, Michigan

19





Get the help of posting in your own town

THE Veedol 10x20 foot poster is the connecting link between Veedol national advertising and the Veedol sign on your door. Nothing can do more toward clinching new customers for you than posting in your own town.

Almost thirty million people are reading the Veedol story in the national weeklies, the national and state farm papers. Thousands of these readers are looking for the Veedol sign. Others will be brought to seek the Veedol dealer by these 24-sheet posters.



Metal Flange Sign supplied free

What the poster tells

These posters tell the famous Veedol sediment story. They illustrate the two bottles showing how Veedol reduces sediment by 86%. More and more motorists every day are realizing that proper lubrication of their cars is the chief factor both of the length of the car's life and of the smoothness of the engine. This is why Veedol is the largest selling motor oil in the United States, marketed through the regular trade channels.

Write to the distributor nearest you today. Adjoining is a list arranged alphabetically according to states and cities. Find out about the Veedol posting plan which will make Veedol the best known high

grade oil in the United States. Find out about the Veedol discount plan by which you can obtain not only the generous dealer discount but from 5 to $17\frac{1}{2}\%$ extra discount.

Drop a card to your jobber today.

Tide Water Oil Company
796 Bowling Green Building, NEW YORK



Find on this list the distributor nearest you and write today for the Veedol posting and extra discount proposition



Distributors and Buyers of Carload Lots Listed Below:

LA		

Andalusia Sessoms Grocery Co.
Birmingham Bobertson Sales Co.
Dothan Grocery Co.
Gadsden Mobile Van Antwerp Whol. Drug Corp.
Montgomery Sylacaug Batson Grocery Co.
Wikle-Sims Auto Co.
Wikle-Sims Auto Co.

ARKANSAS

Benton Payne Oil Co.
Motor Car Supply Co.
Benton County Hdwe, Co.
Four States Grocer Co. Rogers Texarkana

CALIFORNIA

CALIFORNIA

McCoy Motof Supply Co.
Waterhouse, Lester & Co.
Oakland, 2023 Broadway
Oakland
General Auto Supply Co.
San Prancisco
San Francisco
San Francisco
San Francisco
Waterhouse, Lester & Co.
Waterhouse, Lester & Co.

CANADA

Calgary Motor Car Supply Co.
Montreal John Millen & Son, Ltd.
Regina, Sask. Western Motor Sup., Ltd.
Vancouver, B. C. Wood Vallance & Leggat
Winnipeg Great West Saddlery Co.
Winnipeg Great West Saddlery Co.

COLORADO

The Auto Equipment Co., Inc.

CONNECTICUT
Sisson Drug Co
The Talcot Co Hartford
Hartford
New Haven, 422 State St.,
Horton Galla Creamer Co.

DELAWARE

Shallcross Garage The Tire Shop Co.

DISTRICT OF COLUMBIA

Washington, 930 W. 14th St., J. P. Sanner

FLORIDA

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Jacksonville G. Norman Baughman Co. Miami J. T. Weathers Garage Co. G. Norman Baughman Co.

GEORGIA

Ferrill & Wight Co., Inc., Glover Grocery Co.
H. T. Huggins & Son Ozburn Abston & Co.
Davis Tire & Rubber Co.
Downing Co.
W. E. Codyn Co.
Douglas Grocery Co.
D. S. Brandon & Co.
Consolidated Grocery Co.
Hammond Oil Co.
Brandon Grocery Co. Albany Americus Athens Atlanta Augusta Brunswick Columbus Douglas Dublin Fitzgerald

HAWAII

The Pond Co., Ltd. Henolulu

ILLINOIS

Chicago
Motor Car Supply Co.
Motor Equipment Co.
Motor Car Supply House
Motor Car Supply House
Mitchell Oil Company
Barriett Oil Co.
Waukegan
Coverland Brodhead Co.
Waukegan Oil Co.

INDIANA

Decatur
Fort Wayne
Indianapolis
Jeffersonville
La Porte
La Porte

Schaefer Saddlery Co.
National Mill Supply Co.
The Gibson Co.
Geo. Pfaus' Son Co.
La Porte Independent Oil Co.

IOWA

Burlington,
Robert Donahue Iron & Hdwe Co.
Cedar Rapids
Council Bluffs
Davenport
Des Moines
Dubuque
Oskaloosa
Ottumwa
Sloux City

DUWA

Cedar Rapids Pump Co.
Capital City Oil Co.
Hippee States Co.
Midwest Auto Supply Co.
Midwest Auto Supply Co.
Harper & McIntyre
William Warneck

W. A. L. Thompson Hwde. Co. Shattuck, George, Iron Co.

KENTUCKY

Kentucky Independent Oil Co. Harbison & Gathright

LOUISIANA

Baton Rouge New Orleans Shreveport

Doherty Hdwe. Co. Rubber & Sup. Co. Lee Hardware Co.

MAINE

Rice & Miller Tupper & Brown Edwards & Walker Rockland Oil Co. Bangor Portland Portland Rockland

MARYLAND

Baltimore Eastern Carl Spoerer's Sons Co. Eastern Shore Auto. Co.

MASSACHUSETTS

Roston
North Adams
North Adams
Springfield
Taunton
Worcester
Worcester

MASSACHUSE IIS
Tide Water Oil Co.
Farley & MacNell
Hossac Auto Supply
Hamilton & Barritt
Onted States Rubber Co.
Alsten & Goulding Co.
E. T. Smith Co.

MICHIGAN

Bay City Bay City Grocery Co.
Dearborn Addison Ford & Sen
Detroit, 844 Woodward Are.,
Bowman-Gould Co.
Grand Rapids Bryant Sargent Co.

Grand Rapids
Grand Rapids
Grand Rapids
Grand Rapids
Grand Rapids
Grand Rapids
Kalmazoo,
Edwards & Chamberlin Hdwe Co.
Saginaw
E. F. Hubbell Auto Sales

MINNESOTA

Albert Lea
Duluth
Minneapolis,
Minneapolis
Minneapolis
Minneapolis
Minneapolis
Minneapolis
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Vestern Motor Supply Co.
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MISSISSIPPI

Greenwood Grocery Co.
A. J. Lyons Co.
I. Lowenburg
Yazoo Grocery Co.

MISSOURI

MISSOURI
Joplin Supply Co.
Kahoka Hamilton Independent Oil Co.
Kansas City Bonniweil, Calvin Iron Co.
Kansas City Faeth Iron Co.
Kansas City White Star Gas & Oil Co.
Moberly
Springfield, Southwest Auto & Supply Co.
St. Joseph
St. Louis Fred Campbell Auto Sup. Co.
St. Louis Geo. T. Matthews & Co.

MONTANA

Northwestern Auto Supply Co. A. M. Holter Hdwe. Co.

NEBRASKA

Lincoln Nebraha The Korsmeyer Co.

Omaha, 10 St. Viaduct, Paxton & Gallagher Co.

Powell Supply Co.

Nevada Auto Supply Co.

NEW HAMPSHIRE

Concord Thompson & Hoague, Inc. Manchester J. B. Varick Co.

NEW JERSEY

Newark, 268 Halsey St.,
Economy Auto Supply Co.
Trenton Weidel Supply House

NEW MEXICO

Albuquerque Bond, Dillon & Co. Las Vegas Chas, Ilfeld Co.

NEW YORK

Auburn
Batavia
Binghamton, Binghamton Oil Refining Co.
Bingham
Binghamton, Binghamton Oil Refining Co.
Bingham
Bononville
Burfalo
Burfalo
Burfalo
Corning
Cortland
Co

NORTH CAROLINA

Asherille
Charlotte
Kingston
Baleigh
Rocky Mount
Tarboro
Washington
W. Sawyer Motor Co.
Dail Overland Co.
H. H. McCoy Co.
Dall Overland Co.
Dixle Sales Co.
Pender Hardware Co.
W. C. Mallison & Son
Barnes Harrell Co.
The Motor Co.

NORTH DAKOTA

Bismarck Metor Car Supply Fargo Fargo Plumbing & Htg.
Fargo Northwest Battery & Elec.
Grand Forks Grand Forks Overland Minot Auto

OHIO

Akron
Canton
Canton
Charlerol
Chillicothe
Cincinnati
Cirecinnati
Cleveland
Columbus

OKLAHOMA
Oklahoma City R. V. Smith Supply Co.
OREGON
Portland
Portland Waterhouse, Lester & Cs.

PENNSYLVANIA
The Garnet Co.
R. W. Wright The Garnet Co.
R. W. Wright
F. S. Harper Co., Inc.
Clearfield Auto Supply Co.

Allentown
Bristol
Ristol
R. W. Wright
Alexandria
F. S. Harper Co., Inc.
Clearfield
Clearfield Auto Supply Co.
Erie, 607 French St.
The Pennsylvania Rubber & Sup. Co.
Harrisburg, 113 Market St.,
Jeanette
Johnstown
Jeanette Auto & Machine Co.
Jeanette Johnstown
Lancaster
Lancaster
New Kensington
Norristown
Philadelphia
Philadelphi

RHODE ISLAND

Providence Waite Auto Supply Co.
Providence H. Midwood Sons Co. SOUTH CAROLINA eston The Bailey-Lebby Co.

Charleston The Balley
SOUTH DAKOTA
Fish & Deadwood
Sioux Falls L. & L. Motor Supply Co.

TENNESSEE Chattanooga Southern Auto Supply Co. Knoxyille C. M. McChung & Co. Memphis Ozburn-Abeton & Co. Nashville Hirsig Auto Supply Co.

TEXAS

J. M. Radford Grocery Co.
Walter Tips Co.
Western Motor Supply Co.
Panther Auto Supply Co.
Panther Auto Supply Co.
Ulman, Stern & Krauses
Stadiler Auto Supply Co.
Weinrich Motor Sales Co.
Western Auto Supply Co.
Western Auto Supply Co. Abilene Abilene
Austin
El Paso
Fort Worth
Fort Worth
Galveston
Houston
San Antonio
Waco Wichita Falls

UTAH

Salt Lake City Salt Lake Hdwe Co.

VERMONT

Burlington Vermont Hdwe, Co.

VIRGINIA

Bristol Grocery Co.
Owens Merritt Co.
Apperson-Lee Motor Co.
W. H. Grover
Cottrell Saddlery Co.
E. L. Taylor & Co., Inc.
Nelson Hdwe. Co.
Cooper Mdse. & Oil Co. Bristol
Danville
Lynchburg
Norfolk
Richmond
Richmond
Roanoke
Winchester

WASHINGTON

Ballou & Wright Halley Mason Hdwe. Co. Automobile Supply Co.

WEST VIRGINIA

Midleburg Garage
Williams Hdwe. Co.
Carter & Turner
Logan Hdwe. Co.
H. P. Dila Sons Co.
Earle Rogers Co. Charleston Clarkesburg Huntington Logan Parkersberg Wheeling

WISCONSIN

Burlington
Green Bay
Kenosha
Madison
Milwaukee
Minnesota
Manttowee
Minnesota
Muricoloria Hanson Oil Co.
Morley Murphy Hdwe, Co.
D. B. Pedley & Son
Pennsylvania Oil Co. of Wia
Phillip Gross Hdwe, Co.
Milwaukee
Minnesota
Junction
Independent Oil Co.

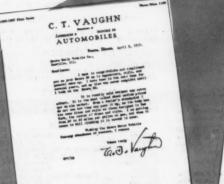
VEEDOL

MO



RE

Evidence of Moore Dealer





lhe World's Bigglest





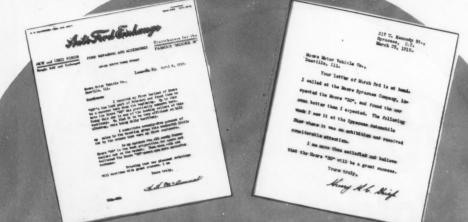
MOORE MOTOR VEHICLE

MO

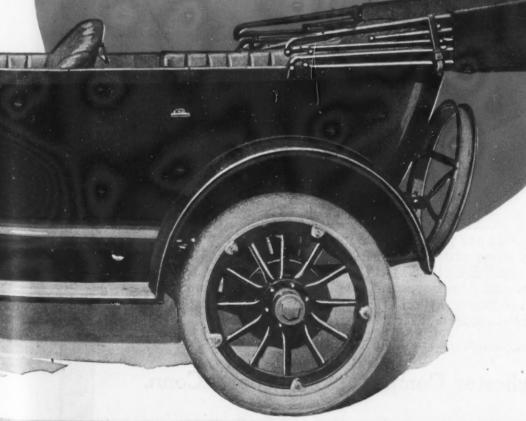


RUS

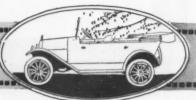
and Owner Satisfaction



Little Automobile \$895%



COMPANY-Danville, Illinois





AMERICA'S FOREMOST cars for 1919 are equipped with this clutch facing. It has proven in the most exhaustive tests, far superior to any other product used for the same purpose. Leading engineers adopted RAYBESTOS MOLDED CLUTCH FACING because it decidedly improves the operation of the disc clutch and improvement in this direction is a DECIDED advancement in the perfection of the modern passenger car, truck or tractor.

Positively and definitely guaranteed as to service and efficiency

The Raybestos Company, Bridgeport, Conn.





TRADE

makes the entire Cooling

Jour car -

Perfect!

NO MORE LEAKS—anywhere in the cooling system. NO MORE RUST OR SCALE. Better engine performance. Less up-keep cost.

\HE apparent simplicity of the cooling system fools many a car owner. He doesn't realize how much engine trouble really begins in the cooling system.

Improper cooling very often causes scored cylinders, pitted valves, seized pistons and hundreds of dollars of needless expense.

Leaks-Rust-and Scale are the trouble makers of the cooling system.

With "X" Liquid the car owner has the only safeguard against these troubles. Chemical science has pronounced it perfect!

Simply pour "X" Liquid into the radiator. Leave it there. It works automatically-and will repair cracks in the water jacket; in valve pockets; small holes in the radiator, pump, connections, gaskets, etc. "X" will quickly repair one leak-or one thousand—and do a permanent job.

EVERY water cooling system is being eaten away by Rust. A deposit of Scale keeps the heat inside the engine and interferes with proper lubrication.

The same "X" Liquid that repairs leaks also has a chemical action that loosens all Rust and Scale. absorbs the free oxygen in the water. It prevents new Rust from forming. It doesn't allow the lime and magnesia in the water to deposit new Scale.

In this way the narrow water passages are kept free from Slime, Rust and Scale. The cleansing action of "X" tones up the system-saves oil and gasoline-and helps the motor perform better.

Eighteen months of laboratory and road tests have definitely proved that "X" Liquid positively makes all water cooling systems 99.2% perfect—as good as the day the car came from the factory!

What "X" Liquid does:

- 1. Repairs all leaks permanently-in 10 minutes.
- 2. Repair stands pressure of 2000 pounds.
- 3. Prevents new leaks-keeps cooling systems LEAK-PROOF.
- 4. Loosens all Rust and Scale.
- 5. Prevents new Rust and Scale - keeps cooling system RUSTPROOF and SCALE-PROOF.
- 6. Helps keep the engine cooler.
- 7. Saves Oil.

Not a Radiator Cement!

Don't confuse "X" Liquid with radiator cement or flaxseed meals in powder or liquid form. These clog the cooling system and often damage it. "X" is the only scientific process guaranteed to keep cooling systems LEAKPROOF-RUSTPROOF-SCALEPROOF—and troubleproof. Used by the U.S. Government, Standard Oil, American Telephone & Telegraph Company, etc.

> Standard Size \$1.50 Will do a \$25 repair job!

> Ford Size 75 cents Will do a \$10 repair job!

Over 25,000 progressive dealers now sell "X" LIQUID. Many of them sell "X" Liquid exclusively.

"X" LABORATORIES, 636 Washington St., BOSTON, MASS.

Pacific Coast Branch, 433 Rialto Building, San Francisco, Cal.

This Jobber Is Planning To Make You The Biggest and Most Prosperous Dealer in Town

Here Is a Wonderful Franchise Backed by a New Kind of Dealer Sales Service. But You Must Act NOW if You Want It

All You Have to Do Is Sign and Mail the Coupon Today

There are 20,000 Timesco Dealers being appointed in 20,000 towns. They are falling in line fast. They know there is more money in the Timesco way of doing things than there ever was in the old method. They're out after the biggest business they've ever done-and they're going to GET it! There's only one word for those dealers who haven't lined up with the Timesco proposition: HUSTLE! Being the Timesco Dealer in your town assures you of something never had before: unlimited co-operation—ACTIVE co-operation-from your jobber, in moving your goods across the counter, bringing new customers into your store, increasing profits and reducing costs. It's worth QUICK ACTION.

Our 14 years' experience as auto supply dealers has given us an outlook on the dealer's problems which no other jobber possesses. We know what you need—we know what kind of SERV-ICE will bring you success: rapid business growth. And we'll GIVE it to you.

Just how we're going about it is told in our wonderful new catalog-a book such as no jobber has ever published. And incidentally, it lists all the standard auto supplies on the market, showing, instead of per-plexing discounts, the NET PRICES TO DEALERS. It's by far the easiest catalog to order from that you've ever seen.

It's yours for the coupon. Get it-and look into this Timesco Dealership today.



A new Timesco Catalog for Consumers, showing regular list prices of all standard supplies, will be furnished in quantities to Timesco Dealers at nominal cost, with dealer's name and address imprinted. A splendid sales stimulant.





Main Office-NEW YORK, N. Y., 1765 Broadway

Distributing Branches	in the following	cities:
Albany, N. Y.	Memphis, Tenn.	



	MAIL THIS COUPON TODAY
Times Square Auto 1765 Broadway, I	
	Let's have that book—"The Timesco Dealer"—and all the details of your business building plan for dealers.
Dealer's Name	
Street Address	
Town	County
State	

Baker Tire Covers

Highest Quality • Perfect Workmanship

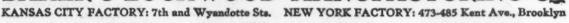


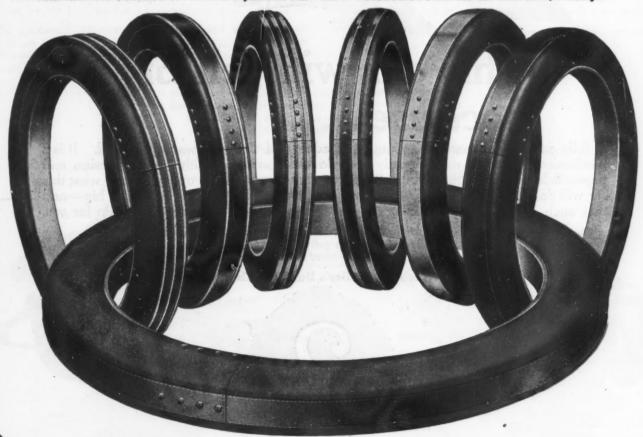


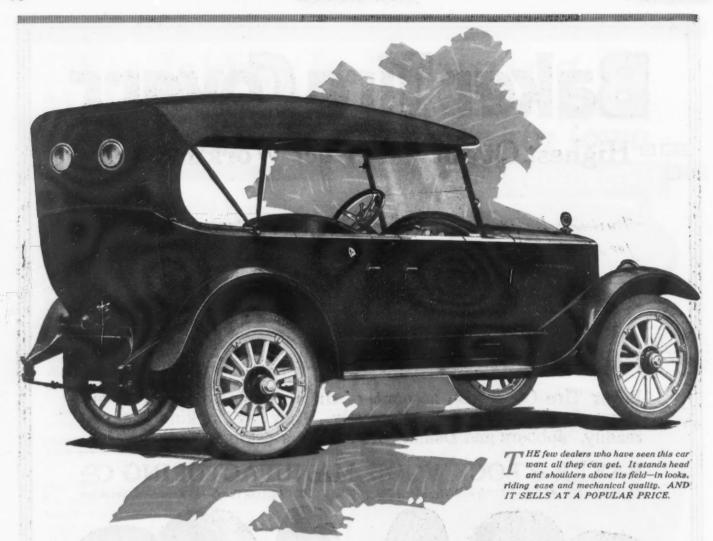
Catalog of Complete Line on Request

Baker Tire Covers, on account of their adjustable features, are guaranteed to fit all Tires Perfectly. They are the kind that sell readily. Jobbers and Dealers are safe in stocking the Baker line.

BAKER & LOCKWOOD MANUFACTURING CO.







This car will sell big because.....

It fully meets a demand that, until the advent of this car; was unsatisfied. It is a mechanically fine and exceptionally good looking car; absolutely new in design and unparalleled in accomplishment. When you have read on the opposite page what this car will do, you, as a dealer, will instantly appreciate that the car must sell big—and that such a car, at a popular price, constitutes a most desirable dealership for you.

Without waiting for the public announcement in June, when your territory may be closed, you can get our proposition now by addressing Department X, Publishers of

Motor Age, Maller's Building, Chicago





An engineering result leisurely evolved during the war

Good American Automotive Engineers have always wanted to build such a car.

During the war our engineers seized the opportunity. Thoughtfully, painstakingly, carefully and slowly the design of this new car was worked out. Not a radical but an intensely refined family car, exceeding in many respects the nice European practices that have been the envy of ambitious American engineers

What this Car will do-

From a standing start it attains a 40 mile speed in 20 seconds, 58 mile pace in 52 seconds; leaving nothing to be desired as far as acceleration is concerned,

Its maximum efficiency is maintained at all speeds from 12 to 38 miles per hour. Thus, at all normal driving speeds, it develops full power and does it economically.

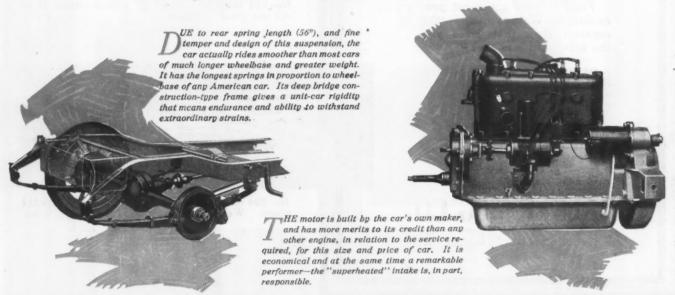
With two passengers, this car went over the Uniontown Hill, Pa., at 31 miles per hour (on high). Did you ever know any other car that made such a record?

It handles easily—has short turning radius—unusual leg room and passenger comfort—

AND IT SELLS AT A POPULAR PRICE.

Dealers who secure this "Superformance" Car will make money. They will be backed by national advertising and a practical program of cooperation with local newspaper advertising. Write to the publishers today, for the proposition.

Address Department X, Publishers Motor Age, Maller's Building, Chicago



WALKER

FOR FORDS

PATENTED

A positive Ford essential. Supply the support absolutely necessary to Ford construction.

Securely brace front axle, hold it in proper alignment. Abolish bending. Eliminate breakage. Establish a dependable degree of safety — and lengthen the service existence of the machine.

The most advanced type of Auxiliary Radius Rods on the market. Strong, sturdy construction—of utmost power of resistance.

Ready for immediate installation. Everything complete. No mechanical skill required. Not even a hole to bore. Clamp to rear of regular Ford rod—fasten to axle. Regular Ford perch bolt used with all but No. 701, which clamps to front axle.

Radius Rods are bought principally for protection.

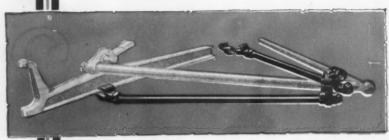
Ford drivers get most protection in Walker-made — the superior style that gives you the safeguard you seek.

DEALERS — Walker Auxiliary Radius Rods are stocked by nearly all jobbers. If yours can't supply you, write us.

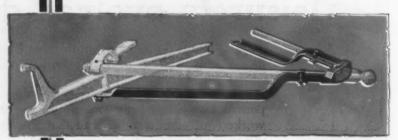
Excellence of construction—plus extensive publicity — make the Walker brand the speediest seller and most satisfactory to users.

WALKER MFG.CO.

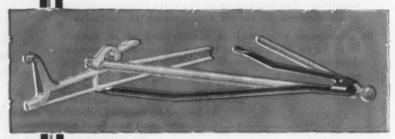
32 Hamilton Street, Racine, Wis.

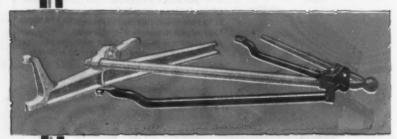


No. 701 made of solid 3/4 in. steel rods, malleable threaded clamps. Weight......12 lbs.



No. 702 made of 1 in. x 1 in. x 3/16 in. Angle Iron.





Save Hours of Tiresome Grinding

ONSERVE time and labor,—increase shop efficiency twenty times over and thereby reduce your overhead and increase your profits by refacing and reseating valves the efficient Sioux Way.

SIOUX REAMER Insures accurate grinding of valve seats. Makes perfect fitting valves in one-twentieth the time required by the old method. Is absolutely accurate. Note how reamer shank keeps reamer perfectly centered and insures accurate cutting.

SIOUX REFACING TOOL Applies same principle and smooths the face of the valve in short order. Works like a miniature lathe. A few turns fits the valve perfectly to the valve seat.

SIOUX SERVICE We keep Sioux Tools ground and sharpened. All you pay is transportation charges. Workmanship and material guaranteed.

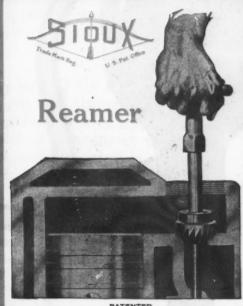
Your Jobber Sells Sioux Tools

ALBERTSON & CO. -:- SIOUX CITY, IA.



PATENTED FEB. 17, 1914 NOV, 26, 1918

Refacing Tool



PATENTED FEB. 17, 1914 NOV. 26, 1918

Sell only Genuine Steward parts for Steward Custom NECESSITIES

"Look for the Red Tag"

"Hang up this Sign"

Advertisement Number One of a Peries



We Sell Only
AUTHORIZED

REPAIR PARTS

THIS OR RED TAG



ATTACHED TO ALL GENUINE Stewart PARTS

"This Is a Poor Imitation of What You Ask for"

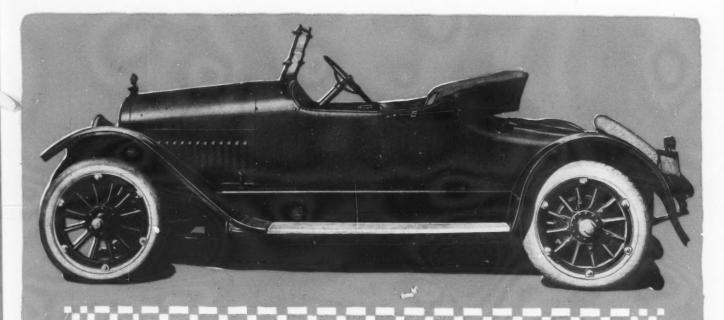
If a dealer would DARE say this to his customer when he offered him an imitation part, he knows he would not make the sale. Since he doesn't DARE say this, is he FAIR to himself or his customer in selling imitation parts at all?

Therefore, sell only GENUINE stewarb Replacement Parts

Stewart-Warner Speedometer Corporation

Chicago, U.S.A.

Always Show your Customers the Red Tag



MERICAN The Balanced Six

A Car That is Its Own Best Salesman!

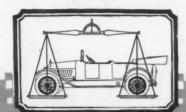
To best appreciate the effect produced by this even distribution of weight in the AMERICAN SIX, try it on the road. Its roadability is a revelation—no swaying at high speed—no sidesway on sharp turns. It "rides"—does not jump the ruts.

From radiator to tail lamp this Balanced Six is assembled and co-ordinated into one complete and thoroughly efficient piece of engineering. It is beautifully appointed. It is a car that YOU can sell against any car of its class in the field. Our special distributor proposition is mighty attractive. Write or wire for it.

AMERICAN MOTORS CORPORATION

Sales Offices: 141 Broadway, New York City Factory: Plainfield, New Jersey

5 Passenger Touring Car 122-Inch Wheel Base



44 Horsepower \$1765 F.O.B. Plainfield, N. J.

For the First Time the Principle of Balance Is Correctly Applied in a Car of Light Weight

THIS is not wholly a *new* principle, for engineers recognize balance as a fundamental feature of advanced automobile design. But it has remained for the builders of the American Balanced Six to apply this principle *correctly* for the *first* time in a car of *light weight*.

The distribution of weight in the AMERICAN SIX is so scientifically exact that the load varies hardly a fraction of a pound over each of the four wheels.

The result is amazing.



Remember that time miles from home when your Triangle B wrench made good? Remember that feeling of satisfaction when it took hold like a bull dog and stood the gaff when you put your back into it? When the jaws didn't strip—when the tool gave you five minutes of the honestest service you ever enjoyed.

It took half a century of Billings & Spencer experience to make that tool just like that. So most good cars carry Triangle B tools in their kits. How about yours, please? If by any chance you are carrying the uncertain kind, you can remedy the matter at any hardware store or at most good garages. It pays to be *sure*.

0



Quality Products at Business Getting Prices

Tred-Wel Tires and Last-Wel Tubes are available to jobbers, distributors and dealers looking for quality products that meet the requirements for service, yet are in an attractive price class.

Tred-Wel Tires are presented as high class tires that sell at a moderate price. They are not in the cheap price class—they are anything but cheap tires.

We realize the demand for a tire of this kind. You have felt this demand throughout the trade. Car owners want a tire that does not represent a great outlay of money, yet will give its full measure of mileage and service.

That's the kind of tire you will find the Tred-Wel to be. An honestly made tire, with sensible claims made for it, has a market—a big market.

Write for details of our selling proposition. You will appreciate the plan.

WIRE OR WRITE TODAY

TWIN TUBE & RUBBER COMPANY

CHICAGO, U.S.A.

Address Sales Dept., 1002 Michigan Avenue



BRUNNER

AIR COMPRESSOR FITTINGS

Take Valves for Instance:

Ordinary valves will not hold compressed air. Special design, selected materials and extreme care in perfecting a ground fit are necessary in making a satisfactory air valve. Hand operated or automatic—each type is an individual engineering problem. Brunner engineers have perfected air valves and other fittings, that Brunner outfits might not at any time give unsatisfactory service because of some apparently unimportant part.

Take Air Hose as Another Example:

Think of the trouble you have had with poor hose. Brunner "Resistoil" Air Hose has been designed and made to avoid even this trouble with Brunner outfits. And, so on down through the list,—Reducing Valves, Controllers, and all compressor accessories; each item is a perfect unit to make a perfect assembly.

A compressor outfit is no better than its component parts. One poor fitting anywhere in the system will prevent good service. For safety and convenience to yourself and for service to your trade, equip your outfit with Brunner fittings.

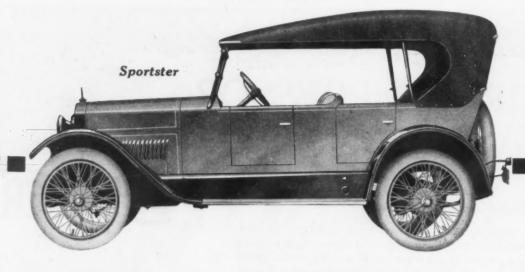
Regardless of what compressor you are using, you should use Brunner fittings. Write us for details--name your jobber.

BRUNNER MANUFACTURING CO.

Main Office and Plant UTICA, N. Y.

Cincinnati Branch,

CINCINNATI, O.



ELCAR Super Points

Super Points
Four-cylinder models have powerful, long stroke Elcar-Lycoming rotor, developing 37 1/2 horsepower at 2,100 r.p.m. Six-cylinder models have Red Seal Continental 3/4 x 4/2 inch engine, developing 40 horsepower at 2,100 r.p.m. Outside the power plants the Elcar Sixes and Fours are practically the same. Two unit electrical system. Long wheelbase, 116 inches. Road clearance, 10½ in. Full floating rear axle with spiral bevel driving gears. Tim ken Roller Bearings in front and rear wheels. Double universal drive; tubular propeller shaft. Copper cellular radiators. A wonderfully easy riding semi-elliptic spring suspension. Roomy and comfortable bodies of beautiful design and durable finish; new "Cathedral Pipe" upholstering. Equipment component on radiator.

ELCAR Price No Index to ELCAR Value

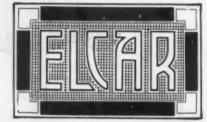
THE newer ELCAR models demonstrate that you can't judge a car by its price. The automobile market offers no other value so remarkable as the ELCAR at its moderate price.

The super value of the ELCAR is chiefly due to the fact that for years we manufactured cars in the \$3000 class only, which experience taught us how to put out a real value car at a low price.

Look at the long, sweeping, stylish lines, lustrous finish, rich upholstery and the high grade appointments. Try out the motor, spring suspension and mechanical details. You'll quickly join the ranks of ELCAR enthusiasts.

DEALERS: Telegraph us for information concerning agency in your territory

Touring Roadster



Sportster Sedan

1919 PRICES

FOUR CYL.
MODELS

5-Pass. Touring \$1175

4-Pass. Roadster \$1175

4-Pass. Sportster \$1175

5-Pass. Sedan \$1725

> SIX-CYL. MODELS

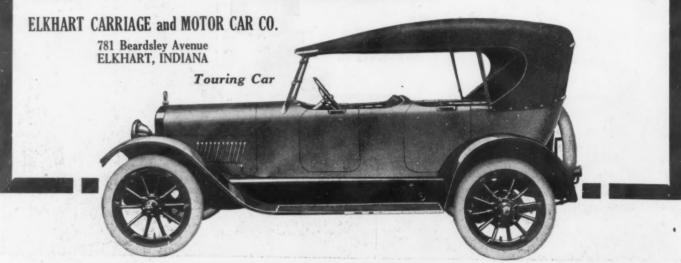
5-Pass. Touring \$1375

4-Pass. Roadster \$1375

4-Pass. Sportster \$1375

5-Pass. Sedan \$1895

Send for Catalog containing just the model you've been looking for.



STANDARD EIGHT A Powerful Car

Increased Production Creates Opportunity for a Few More Dealers

The usual method is to establish dealers and create a demand for the cars.

The power and stability of the Standard Eight, plus the conditions now existing in the automobile field, have created the demand *first*. Increased production and a larger organization of dealers is now following to take care of business already assured.

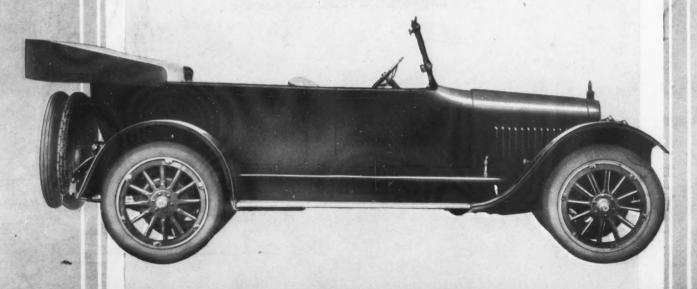
The dealer has behind him the co-operation of one of the largest industrial organizations in the world. This insures a business stability and permanence which gives confidence to his sales organization as well as to his customers.

National advertising on a large scale in The Saturday Evening Post, Collier's, Literary Digest, Vogue, Vanity Fair, and other magazines will keep the Standard Eight in the minds of buyers throughout the year.

Full quotas and prompt deliveries are offered to desirable dealers. Write for particulars.

STANDARD STEEL CAR COMPANY

AUTOMOTIVE DEPARTMENT Pittsburg, Pa.



STANDARD EIGHT A Powerful Car

A Powerful Car

The Standard Eight New Sport Model combines style and elegance—trim, racy lines—and the Power that puts the sport in motoring.

Hills that other cars just make on high, all models of the Standard Eight not only make, but climb easily—finishing faster than at the start.

Power is comparative, and Standard Eight Power is startling to the driver who has never before seen it demonstrated.

Sport, Touring Car, Sedan, Coupe, Limousine, and Roadster Models. A demonstration sells them.

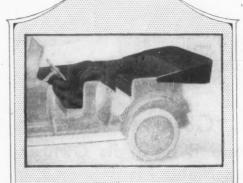
Write for dealer's proposition

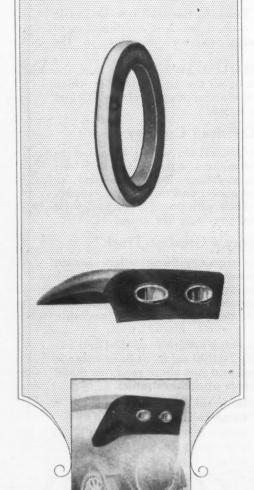
STANDARD STEEL CAR COMPANY
AUTOMOTIVE DEPARTMENT
Pittsburg, Pa.











Seat Covers

Compare them with any other make. Be critical! Consider quality. Consider price, fit, finish—everything!

BADGER COVERS ask no "odds." They have no excuses to offer. We state definitely—without any reservation whatever—that Badger Covers are the greatest value ever offered.

Investigation will convince you absolutely of Badger superiority. Endless selection of fabrics and colorings. Glove perfect fit guaranteed. For practically all makes of cars. Prices as low or lower than asked for inferior makes. Extensive advertising—unrivalled excellence—and cost economy make them exceedingly profitable for dealers.

Slip Roofs

New Type. Remarkable improvement. Durable weather-resisting materials. Style never before attained in a re-cover. For all popular makes of automobiles. Absolute fit. Cut by car manufacturer's patterns. Nothing complicated. Come ready to put on. No trimming—no measuring. Simply place in position and tack on. Job complete in few minutes' time—by anyone who can use a hammer. Tremendous demand. An unusually attractive proposition for dealers!

Tire Covers

Made with as exacting care as finest upholstering. Toughest of wear-resisting materials. Utmost of tire protection with most pleasing appearance. Never has so much style and service worth been offered in a Tire Cover. A rapid seller.

Back Curtains With Plate Glass Windows

A distinguished Pierce-Arrow effect. Nothing gives so great a tone of class to a car—any car. Beautiful crystal-clear plate glass windows instead of dingy, cheaplooking celluloid. Trim, tight fit. No wrinkles. No cracking—no creasing. A positively faultless back curtain. Meets a real need. Remarkably reasonable price—due to gigantic output.

DEALERS—the better the grade of accessories you sell, the better your business will be. Get acquainted with the Badger Line. Be sure you are handling the best. TODAY—write for catalogues.

Wisconsin Auto Top Co.

7 Main Street RACINE, WISCONSIN

erica's Greatest Trucl

WISCONSIN MOTOR WISCONSIN REAR AXLE SHELDON FRONT AXLE FULLER 4-SPEED TRANSMISSION HELE-SHAW CLUTCH MATHER VANADIUM SPRINGS PERFEX RADIATOR ROSS STEERING GEAR SMITH METAL WHEELS ENCLOSED CAB WEATHER-TITE VESTA ELECTRIC LIGHTS

It Will "Go-Over Big" On the Pure Basis of Its Own Remarkable Merit

No other Truck in the world embodies in its make-up such a brilliant combination of 'all-star" units, as we assemble in the MUTUAL.

Yet the MUTUAL price is lower than the average price of all the good trucks in which any three of the accompanying eleven Mutual features is included.

Overload Capacity

The 2-ton MUTUAL would be rated as 3-ton by most makers; our 31/2-ton as 5-ton; and our 5-ton as 7-ton. But, by underrating both our horse power and our carrying capacity, we keep faith with our dealers and their customers, and play safe for ourselves.

"America's Greatest Truck"

Will be America's quickest seller-for an equal value was never offered before in any one truck; and every MUTUAL sold will give so good an account of itself in service that the Mutual Agency will become a veritable gold mine.

Territory is being assigned rapidly; and our new plant with 20,000 sq. ft. of floor space is now completed and just about ready to make its first shipments of demonstrators.

> Write, telegraph; or better still, come to Sullivan!

TUAL TRUCK COMPA



What You Can Do With Low-Grade Fuel



It has more actual explosive energy than higher grade gas, but it takes a spark of extraordinary intensity to ROUSE it.

he gasoline you get nowadays is slow going, temper trying. Its response to the average spark is half-hearted phlegmatic.

And yet, if you knew what a mighty "kick" was concealed in its sluggish depths, you'd never want to go back to the filmy, "high grade" stuff you used to use. For as heavy as it is, this present day fuel possesses a greater volume of heat calories—explosive energy—than your old-time quick-firing mixture.

If You Could Only Get the Right Spark—

It was when the advent of low grade fuels created a need for something new in ignition systems, that Philbrin Ignition came into being. There was POWER in that heavy gas—and Philbrin was designed to draw it out; to get at it and utilize it.

And those who have tried it know what the Philbrin spark is: A thing of phenomenal power—tearing into the mixture with violent intensity.

For a wonderful new form of contact maker had been invented.

Suiting the Spark to the Mixture

This contact maker causes the spark to vary in character, according to the speed of the engine and the demands of the mixture. In other words, Philbrin Ignition automatically provides whatever kind of spark is needed—for rich mixture or for lean mixture, for slow speeds (as at starting) or for high speeds—

And accomplishes its purpose by means so extraordinarily simple and so unfailingly efficient, that the likelihood of trouble—even the most trivial kind—is practically banished.

With Philbrin on your car or truck or tractor, you won't be sadly desponding over the quality of your gas—you'll be thankful for it, and all the power it carries. And you will exercise economies in fuel consumption that will be a positive revelation.

These things are worth while. Send for Philbrin literature and get the detailed story—Catalog M.

PHILIPS-BRINTON CO.

S-BRINTON CO.

Ignition Specialists

KENNETT SOUARE, PA.

503 South Broad Street

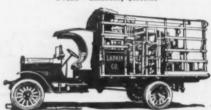
You, Too, Can Get a Share of Stewart Profits



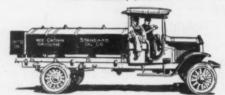
Stewart Model 6-3/4 ton capacity Price-Chassis, \$1050.00



Stewart Model 8-1 ton capacity
Price-Chassis, \$1575.00



Stewart Model 9-1½ ton capacity Price-Chassis, \$1975.00



Stewart Model 7-2 ton capacity



Stewart Model 10-3½ ton capacity Price-Chassis, \$3500.00

Join the Men Who Are Making Good With Stewart

THERE never was such a time for making good in the truck industry. With the national and state governments spending millions for better roads, with transportation facilities crowded, business men, store keepers, and farmers are turning more and more to the truck as a solution of their haulage problems. It is not a question of educating the public to the value of trucks. It is a question of having the right truck—and a full line.

Stewart Has a Full Line — From ¾ Ton to 3½ Ton Trucks

Stewart dealers have a price advantage. The Stewart design has eliminated 600 to 700 parts, cutting down the selling price by \$200 to \$300.

This means fewer parts to wear out or replace, simplicity, ease of operation, less unsprung weight to wear tires, burden the engine or consume fuel—advantages which have made the Stewart the choice of 200 lines of business. These points sell Stewarts against any competition.

In over five years no Stewart has worn out—the first 50 built are still in service.

You, too, can get a share of Stewart profits. The opportunity to join us will be open for a short time. If you measure up to Stewart dealer standards wire now.

Stewart Motor Corporation, Buffalo, N. Y.





The Easiest to Sell and the Hardest to Compete Against

Carlisle Tires, made of Rope, have 10 Talking Points to One in the Ordinary Tire

Talking Points on the Ordinary Tire

Talking Points on Carlisle Tires

Sea Island Cotton— Pure Para rubber

BUILT on specially invented machines— Rope carcass—Unbroken strands— Each strand individually inspected— Breaking resistance of each strand 235 pounds—Each strand insulated—No two strands touch or rub—Internal friction abolished—Cool at 60 miles an hour— All strands under perfectly uniform tension—Astonishingly resilient—Make a car "ride differently"—Save wear and tear on car mechanism—Cut repair bills—Increase gasoline mileage—Retreading advocated-Blowouts almost unknown—Loose treads unknown—Sand blisters unknown—All usual run of tire troubles practically unknown—100 pounds of friction pull (against 18 to 30 in the ordinary tire)—Lightning Tread, something more than a good looking nonskid—Easiest riding tire ever built— Likewise the fastest tire—Shock absorbers can be thrown away—Built for rough usage—Prices reasonable.

CARLISLE CORD TIRE COMPANY, Inc.



Factory: Andover, Mass.











What Makes an Organization?

W HATEVER may have been the experience of the executive heads of an organization, its full fruition would never be realized if they employed migratory workers—men who were constantly drifting from factory to factory and job to job.

Yet this is a common experience in many large plants.

The period of service of Sheldon employees dates upward of 46 years. The average for the entire working force is well over a quarter of a century. This is an extraordinary record.

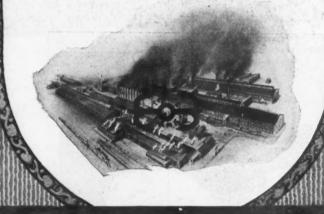
That the greatest worm drive truck axle the world has ever seen should bear the name of Sheldon, is due, in no small measure, to the fact that the men who build it have done the one thing in the one plant all their lives.

SHELDON AXLE & SPRING CO.

Makers of Axles and Springs for Heavy Duty Service for more than 50 years.

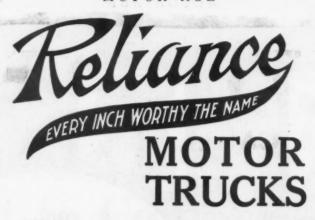
Wilkes-Barre

Penna.



SHELDON

1½ TON



2½ TON

Specifications

MOTOR-The well known Buda Heavy Duty Truck Motor.

TRANSMISSION — Fuller Transmission in unit with motor.

CLUTCH — Multiple disc dry plate clutch.

CARBURETOR—Stromberg.

IGNITION—Bosch Magneto with steering column control.

BEARINGS—Front and rear axles equipped with adjustable taper roller bearings.

UNIVERSAL JOINTS—Hartford joints, extra large size.

FRAME - Pressed steel, larger section than ordinarily used on trucks of same capacity.

SPRINGS - Sheldon alloy steel springs.

STEERING GEAR—Ross steering gear.

RADIATOR—Built up type, carried on ball trunnions.

CONTROL — Left hand drive, center position of levers.

REAR AXLES—Badger external spur gear axle on all models.

You Will Decide Your Future By the Steps You Take Now

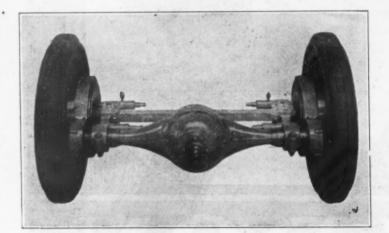
In a few years conditions in the motor truck industry will not be as they are now. The agency for a good truck will not be so easily secured.

With that in mind, use more than ordinary care now in the selection of the truck you want to sell. Investigate not only the truck but the merchandising methods back of it, the stability of the company building the truck and the personnel of the entire organization.

These will be mighty important things for you to know. Don't overlook their direct bearing on your future success.

We encourage an investigation of this kind into Reliance Trucks and the Reliance organization. We are building trucks

> that have always had a good record. They are trucks that will hold their place as quality hauling units.



BADGER EXTERNAL SPUR GEAR AXLE

The gears are fully enclosed and run in grease. All gears are cut in our own plant out of nickel steel, heat treated, and will outlast any other type of drive. Entire weight of load is carried on a dead axle, relieving the differential housing of all load strains.

Write for Details of our Dealer Proposition.

RELIANCE MOTOR TRUCK CO., Appleton, Wis.

DOUBLE CABLE GROTIRES



WEAR BETTER, LONGER And SAVE GASOLINE

HERE is one of the reasons dealers can enjoy unusual success with the Federal line of tires.

G IVE two cars of identical weight the same impetus and the one equipped with Federal Cord tires will go the farthest, because of the wonderful flexibility of these tires.

THEIR remarkable resiliency effects easier and smoother traction.

THIS advantage qualifies Federal Cord tires to save the car and tires from un-

necessary wear and tear, and in addition to save fuel.

F RICTION and internal heat are minimized because every cord is insulated by impregnating in live supple rubber.

THE cords are built up diagonally in layers, each layer running transversely to the other, thereby affording the greatest possible strength and flexibility.

THIS flexibility and strength is due to superior construction methods.

R OAD shocks do not inflict fatal damage at some one part of the tire because all strains are equally absorbed by the whole tire—every cord bears its quota of the impact. In this way only can the carcass of the tire be preserved and the tire's usefulness prolonged.

THE Federal dealer has the selling advantage of our famous, exclusive Federal tire improvement.

—the Double-Cable-Base in the Cord black tread as well as in our "Rugged" white tread and "Traffik" black tread non-skid

The Federal Rubber Company of Illinois-Factories, Cudahy, Wisconsin

Manufacturers of Federal Automobile Tires, Tubes and Sundries, Motorcycle, Bicycle and Carriage Tires, Rubber Heels and Fiber Soles, Horse Shoe Pads,
Rubber Matting and Mechanical Rubber Goods.

To Distributors of Automotive Equipment



THE Utility Model gives a free air service and produces sufficient sales, not otherwise made—to show you a profit of over \$400 in a year, turning a heretofore liability into an asset. Ask for further particulars.

THE advertising that we have been doing nationally for the past four months has resulted in securing for us many inquiries from all parts of the United States and many of these inquiries have been turned into direct sales.

More sales can be secured by having an intermediary who will act between the inquirer and ourselves as distributor, and one who is interested in selling more air compressors this coming season.

To such a concern we can definitely prove that they can make more money than they are making, by selling the GENERAL LINE, and will be selling a compressor that will give entire satisfaction to the automotive trade.

You are surely on the lookout for a good proposition and we have it to offer.

Let's get together now!

GENERAL AIR COMPRESSORS

Are constructed along the best mechanical lines and thoroughly guaranteed. They are made in eight different models suitable for the smallest as well as the largest garages. Prices on application.

Send for booklet "THE LOW COST OF COOL AIR"

General Utility Company

Manufacturers

1330 Ogden Street

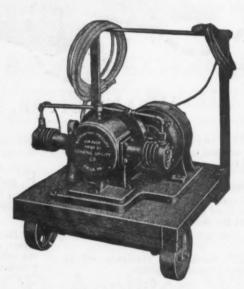
Philadelphia, U.S.A.

Utilities Sales Corporation

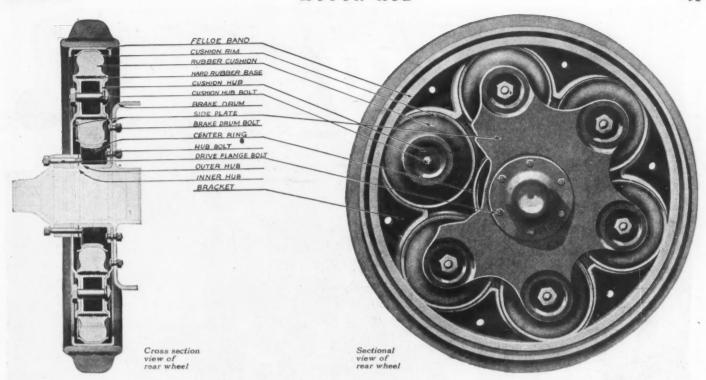
Sole Factory Distributors

Suite 808, New Stock Exchange Bldg.

Philadelphia, U. S. A.



Direct Portable Model



Details of Construction

THE steel "felloe band" is made to S. A. E. dimensions so that any standard make of solid rubber tire may be used. To the inside of this band are riveted six equally spaced malleable iron "brackets" between which are mounted six steel "cushionrims." These rims are tangent to each other, and to the steel "center ring." All of these parts are assembled within the steel felloe band and held firmly in place by contraction of the steel felloe band. The combination forms a light, strong, rigid steel framework that cannot wear, rattle or buckle in any direction.

The "cushion rims" securely retain a soft, selected grade "rubber cushion," vulcanized to a "hard rubber base" on the outside of a small malleable iron "cushion hub."

It will be seen that on each side of the wheel is a steel "side plate" having six integral arms. The extremities of these arms fit into the hollows in the ends of the cushion hubs, and are securely clamped in place by six "cushion hub bolts."

Note that the cup-shaped joint between the side plate arms and the cushion hubs relieves the bolts from all shearing strain, and eliminates any possibility of wear or rattle. The central portions of the two side plates are securely fastened to a cylindrical "outer hub" which fits over the "inner hub" originally furnished on the truck. This construction ties the entire driving portion of the wheel together, and it enables each side plate to take its share of the driving strain.

The Cushions "Float" the Load

The principle of the Jaxon Full Floating Wheel is briefly this—it relieves the axle from all shocks.

On trucks equipped with Jaxon Wheels, the axle is "floated". Rubber cushions which encircle the hub absorb all of the shocks.

The cushions give to the wheel the necessary resiliency to overcome all radial, torque and side-thrust shocks—more than doubling the life of tires and increasing the durability of the truck as a whole, as well as increasing the gasoline mileage.

The cushions are held firmly in cushion rims—no moving parts to cause friction or wear.

Jaxon Full Floating Wheels are now available for a large number of makes of motor trucks. Write for descriptive catalog.

Jaxon Steel Products Company
Wheel Division, 3066 West Grand Boulevard, Detroit, Michigan



Full Floating Wheels



"—saves two-thirds of my Tire Expense"

"Once a week I go over my tires—and seal the little holes and cuts that ruin tires by permitting dirt, oil and water to reach and rot fabric. With the SHALER Vul-Kit I 'vulcanize' these holes with tough, new rubber that makes a lasting job of it. It takes only a few miles—but keeps my tires good as rubber that the provents tire translation of the provents the provent

new—prevents tire trouble—doubles my mileage—and actually saves ²/₃ of my tire expense."

It's easy to sell. Motorists are looking for a tire-saver like this. Their word-of-mouth endorsement of the SHALER to their friends gives you a chain of sales. The repair material they buy of you to use with this vulcanizer gives you "repeat" profits that come to you regularly—without effort. You make a good profit selling the Vul-Kit itself and big, steady "repeat sale" profits.

SHALER Vulcanizers are advertised regularly throughout the year. Motorists are now reading the large, dominant advertisements in the leading national and motorist publications. Every car-owner needs a SHALER Vul-Kit—sell it to him and make these big steady profits for your self. Complete Outfit only \$3.50. Price slightly higher west of the Rockies and in Canada.

Order From Your Jobber Now-Write Us for Catalog

of the complete line of SHALER Vulcanizers for garages, tire repair shops and motorists' use.

C. A. SHALER CO., 223 Fourth St., Waupun, Wisconsin

Oldest and Largest Manufacturers of Vulcanizers in the World

GOODELL-PRATT

1500 GOOD TOOLS



Automobile Tools

Made with the thought uppermost that there is a real need for better tools for motor car maintenance.

Our complete catalog illustrates and describes in detail hundreds of tools particularly adapted to this class of work. Write for your copy.

GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass., U. S. A.

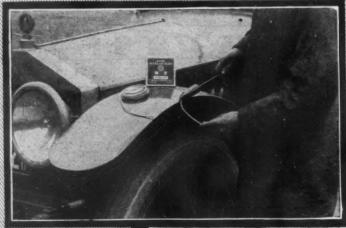
No. 455

GOODEL-PRATT COMPANY GREENFIELD MASS.U.S.A. No. 3

No. 415

No. 366

For General Auto Repairing



Self-Fluxing Solder

Saves Time & Expense

Car owners, garage and service men should have a supply of Kester Solder on hand at all times. The bother of hunting and applying a separate flux or paste is eliminated—Kester Solder is always ready for use. The flux is in the solder—the wire core is made up of cells filled with an acid or rosin flux. No more flux than is needed for the amount of solder used can flow to the job at one time.

KESTER Acid-Core Wire Solder

is inexpensive and saves considerable time and labor for general use. Garage men can go from one job to another with a coil of Kester Solder in one hand and a soldering iron in the other. It is indispensable around the garage or service station—used for radiator leaks, spark plug terminals, gasoline pipe and tank joints, cracked fenders, electrical connections, carburetors, speedometer shafts—any small job where a quick, handy solder will save more expensive repairs. Can be used on any metal except aluminum.

Try It on Your Next Job

Next time you put in a supply ask for Kester Solder. Give it a trial and note the difference in results and time-saving. It is sold in one-pound coils in cartons and on one, five and ten-pound spools.

Chicago Solder Co. 218 North Union Avenue CHICAGO





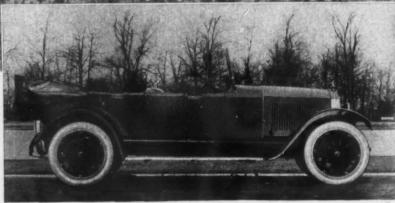
She Wictory Model

MOON BIGHT-SIX

the price of the Moon Car is an appeal to your reason

\$1685

MOON CARS



PHOTOGRAPHS OF MOON CARS ARE NOT RETOUCHED.

Quality throughout

Frame—Pressed steel, especially designed for Hotchkiss drive; with deep strangle in front'to enable short turning radius. Rear tire carrier integral

Wheelbase—118 inches.
Front Axle—Timken I-beam, drop forge, special heat treated.

Rear Axle-Timken pressed steel, spiral

Brakes-Internal and external, 14-inch drums.

Propeller Shaft -Tubular, with two Spicer universal joints.

Springs-Front, semi-elliptic, 39 inches.

Rear, semi-elliptic, 54 inches.
Clutch—Borg & Beck, dry plate type.
Motor—Continental Unit Power Plant;
six cylinders, 3½ x 4½ inches, cast en bloc. New type cylinder heads, removable; pressed steel oil pan; enclosed valves; lubrication pump and constant level splash.

Transmission — Brown-Lipe unit con-struction with motor and clutch, selective sliding gear type, three speeds forward and reverse.

Radiator-Fedders, honeycomb, nickelsilver shell. Water pump circulation. Battery—Exide, six volts.

Starter and Ignition-Two-unit. Bendix drive.

Steering Gear - Worm and gear type; 18inch steering wheel with corrugated rim.

Tires-4-inch demountable rims, extra rim on rear. Rugged tread tires on rear wheels.

Upholstering—High-grade genuine tan Spanish leather throughout; plaited

Top-One-man, California style top of "Never-Leak" material. Bevel plate glass lights. Curtains carried in pockets of top.

Windshield — Two-piece, both halves

ventilating.

Equipment—Foot rail; tobe straps; tool kit carried in front door; jack; tire pump; trouble light connection; light cord; tonneau light; ammeter; oil gauge; lighting and ignition switches with patented lock; storm curtains that open with doors. Motor driven horn.

Body—Beautifully designed with high radiator, full bevel lined type. Instrument board, front and rear, black walnut; wide doors with concealed hinges; comfortable driver's position with spacious leg room; clear running board with deep one-piece stamped crown fenders.

Price: \$1685 f.o.b. St. Louis
Wire wheels \$125 extra

The low cost of driving the Moon car is the final verdict in its favor

MOON MOTOR CAR COMPANY

ST. LOUIS, U. S. A.

MOON CARS

WHY IS AKSALA ELLING SOFAST?

Because It Really Removes Carbon. If It Fails-Money Refunded. It's a Wonder!



Every owner of an automobile, truck, tractor or gasoline engine in your territory is a sales prospect for Aksala-the new and wonderful carbon remover. Probably they have tried ordinary carbon removersbut Aksala must not be considered in the same class as other carbon removers. It is far more efficient and more economical in use. Its vast superiority is proven by the great and growing demand for it, everywhere. Engine owners want this easy and quick method of eliminating carbon-they want the best.

A Scientific Formula

A Scientific Formula

Aksala is prepared from a scientific formula—the result of many years' chemical laboratory research and experimenting. Actual tests in engines with varying degrees of carbon trouble throughout the country prove the great superiority and wonderful efficiency of Aksala Carbon Remover.

Aksala Is Harmless to Oil

Aksala is easy to apply—does no harm to engine—doesn't interfere with the lubrication—has no effect on oil.

Increases Engine Power

It's simply amazing how easily and quickly Aksala loosens and expels carbon, and puts new life, increased pep and greater power into the motor.

Lowers Maintenance Costs

Every gasoline engine should have the carbon removed after every 1000 miles. But owners would find it too expensive to have the engine taken down every time. Here's where Aksala comes in! For Aksala really does the trick economically in a

Cleans Spark Plugs

Simply immerse carbonized plugs in some Aksala—take out and wipe off carbon with brush or cloth. It therefore saves buying new spark plugs—another instance of how Aksala pays for itself.

Show Aksala to Your Customers

You can thoroughly recommend Aksala as the one carbon remover that will really do what is claimed for it. Order a stock now. It will move off the shelves quicker than any other you've sold.

Money Back Guaranteed

Aksala is sold on a "make good" basis. You take no risk in recommending it. Aksala is guaranteed to remove carbon when used as directed. If it fails—money is refunded in full. Full and simple directions printed on each can. directions printed on each can. Dealers: Order through your jobber. If he can't supply you ask us for our profitable proposition today. Jobbers: There is a real demand for an efficient carbon remover. The mail is bringing in dealers' inquiries every day. Push AKSALA—the guaranteed Carbon Remover.

AKSALA CHEMICAL CO.

7430-52 South Chicago Ave.

CHICAGO, ILL.

MOLINE Farm Bodies For Ford Ton Trucks

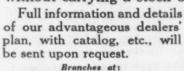
Moline Farm Body Business for Ford-Ton Trucks is affording big, clean profits to many dealers. They sell easily.

It is particularly profitable to Ford Dealers. Many have increased their business 200% and even 300% in a year. Any dealer can do equally well. This is important to you because of the great number of Ford-Ton Trucks being sold for which bodies must be supplied.

You can supply this demand with the Moline complete line of Highest Quality commercial bodies for Ford-Ton Trucks and Model T Ford Chassis.

Illustrated here is one of the most popular sellers of the entire line, the Moline Farm Body No. 422. This is one body plus a stock rack and a tip top box affords a truck body suitable for every farm requirement of all seasons of the year.

With 23 Moline Branches, one in close proximity to every locality, dealers can make immediate delivery without carrying a stock on hand.



Atlanta, Ga.
New Orleans, La.
Dallas, Texas.
Oklahoma City, Okla.
St. Louis, Mo.
Poughkeepsie, N. Y.
Baltimore, Md.
Los Angeles, Cal.
Stockton, Cal.
Spokane, Wash.
Salt Lake City, Utah
Denver, Colo.
Kansas City, Mo.
Omaha, Nebr.
Minneapolis, Minn.
Minot, N. D.

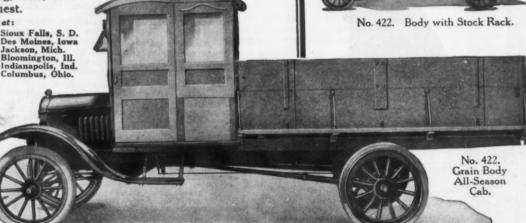


No. 422. Body with Top Box



No. 422. Body with Tip Top Box.





Factory: Freeport, Illinois

MOLINE PLOW CO., MOLINE, ILL.
MANUFACTURERS OF QUALITY FARM IMPLEMENTS SINCE 1865

Quicker—Cheaper and Perfect

IT is a fact that it costs just about twenty times as much to vulcanize a punctured or blown-out tube as to repair it with Magic Rubber Mend.

AND ALSO:

That Magic Rubber Mend leaves the tube in far better condition, than does vulcanizing. For Magic Rubber Mend not only becomes actually a part of the tube, but its strongest part, for it is a finer, tougher, hardier, more resilient material than the composition of which the tube is made.

You can put it on yourself—anyone can—in about two minutes, with no tools but your hands. (It's not a "patch," you know.) It covers, fills in and seals the puncture or blowout—cures the trouble forever. And does the same for cuts, tears and rents in tire casings.

Dealers: A few cans of Magic Rubber Mend will bring you in more business than any tire or tube repair on the market—for it has no duplicate anywhere. Pays a good profit on every sale, and moves fast. Write for particulars.

Repairman's size, \$5.00 Auto size, \$1.00 Motorcycle size, 50c.

EASTERN RUBBER COMPANY
1527 Ridge Avenue Philadelphia, Pa.



When Writing to Advertisers, Please Mention Motor Age

PETERS' METALLIC FILLER will permanently repair any break or crack in a moment's time. It is a low brazing metal compound and makes a permanent repair. It is not a cement or a paste. It takes no experience to apply—you simply follow directions and the result is a perfectly finished job.

A Perfect Braze and a Permanent Repair

PETERS' Metallic Filler is a new low temperature brazing compound of Nicro Spelter for repairing cracks in cast iron, bronze or brass. This compound, a recent discovery by K. R. Peters, melts at 300° and forms a perfect braze which is permanent and wear-resisting.

No more high temperature brazing with its necessary complications. Cracked

cylinders can now be mended without removing them and with full assurance that there will be no danger of warping the bore or changing the alignment.

Anybody Can Do It

Peters' Metallic Filler replaces the old method of brazing because it is quick, efficient and inexpensive. Before only a skilled mechanic who understood brazing and welding could be trusted to do this kind of work—now, your inexperienced workman can do a perfect job by following our simple directions.

It sells for \$5.50 in large containers for Repairmen. Consumer size sells for \$3.00. If your dealer does not handle, order direct.

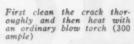
Jobbers: The opportunity to make profits on Peters' Metallic Filler is just opening up. The market for a low temperature brazing is certain, and far-sighted pobbers are preparing to sell Peters' Metallic Filler to their customers. Write for detailed information.

Aluminum Brazing Solder Co.

260 Montgomery Bldg., Chester, Penna.

PETERS' METALLIC FILLER

(NICRO SPELTER)











When Writing to Advertisers, Please Mention Motor Age



There is nothing similar on the market at any price that gives you the authentic, down-to-date, vital information contained in the new edition of THE AUTOMOTIVE WIRING MANUAL.

Contains no "junk" drawings, no unnecessary reading matter to fill space and take up your time when it is most valuable—just a complete compendium of official wiring diagrams in original blueprint form, bound in so you cannot lose them.

Each drawing made especially for the Manual from manufacturer's original shop blueprints or other authorized data -and not merely photographic reproductions from catalogs, trade papers, etc.

Don't be deceived into buying something that is advertised as "just as good" at a lower price.

There is no book published that gives you the same authentic information contained in the original AUTOMOTIVE WIRING MANUAL in blueprint form and of a size large enough to readily show all details.

Anything of genuine worth always has its imitators, but they are never as good as the original.



Contains 750-Official Blue Prints of Largest Car Manufacturers

The AUTOMOTIVE WIRING MANUAL shows you

- In full detail, more about electric starting and lighting systems than any other book of wiring diagrams ever offered the automobile
- writing diagrams ever othered the automobile trade.

 2. Diagrams in blueprint form—7½x11 inches—
 a size large enough to plainly show every detail. Diagrams of smaller size and not blueprints are not nearly so legible and become solled easily through handling.

 3. The exact location of all units just as installed. All circuit diagrams in non-technical form, therefore easy to trace and understand.

 4. How to instantly understand any and all

- circuits without spending several hours tracing wires through body and conduits,—as plain as a floor plan of a building.

 Internal connections of all motors, generators, etc., of all systems used on all cars and trucks. Makes you independent of factory service stations.

 How to test and repair all units quickly.

 How to disassemble repair and assemble any storage battery. No other text book on storage batteries necessary—the Manual gives you complete instructions, thus saving \$3.00 to \$5.00—the usual price of such textbooks.

The AUTOMOTIVE WIRING MANUAL contains 680 pages, of official circuit diagrams, 175 official internal wiring diagrams of generators, starters, coils, etc., 20 pages of instructions on care, repair, and construction of all electrical parts. Every diagram is a full size blueprint showing all details, and is bound in the book so it cannot be lost.

No mechanic, garage or service station can afford to be without this new edition of the official AUTOMOTIVE WIRING S. Pearborn MANUAL. Send for your copy today. \$2.50 will bring the book. Pay the rest when you have examined it and approved its worth.

AUTOMOTIVE PUBLISHING 440 SOUTH DEARBORN STREET, CHICAGO

EIBEWAMN

It Met the Supreme Test!

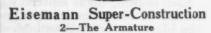
The Ordnance Department of the U. S. Army adopted the Eisemann Magneto exclusively, without any changes whatever, for its trucks, tractors and light tanks during the War.

The Signal Corps of the U. S. Army adopted the Eisemann Magneto exclusively, without any changes whatever, for its trucks during the War.

The Eisemann Impulse Starter was adopted as standard for all Class B trucks, after General Pershing had discarded battery ignition.

And Our Army Trucks and Tractors Were the Admiration of the World

The Eisemann Magneto Co.
Sales and General Offices: 32 Thirty-third St., Brooklyn, N. Y.
Chicago, 910 S. Michigan Ave.; Detroit, 85 Willis Ave. West



The making of the Armature of an Eisemann Magneto is an excellent illustration of the exhaustive and scrupulous attention to detail through which this Company has realized its determination to produce the finest Magneto that can be built.

To complete the Armature Core and Winding from raw material to finished product, requires 49 distinct operations, inspections and tests. Though these processes cannot be described here, it should be pointed out that owing to the extreme care applied both to the selection of materials and to the processes of construction, Eisemann Armatures practically never short-circuit or burn out.

The shadowgraph above reveals the position of the Armature with relation to the Magneto as a whole.



AMERICAN



RUST PROOF WRENCH



COMBINATION SET No. 10

BLACKHAWK wrenches are carefully designed and machine turned to insure an accurate fit. They give better service to car owners and garage men and mean more sales for jobbers and dealers. Made of dependable materials, have Parker rust-proof finish.

The BLACKHAWK line includes a wrench for every need-all guaranteed.

Sell your wrenches by name. Get your trade to call for "BLACKHAWKS." It pays.

WRITE FOR CATALOG AND PRICES

Manufacturers: We make wrenches according to specifications

C. N. & F. W. JONAS

Representatives for American Grinder Mfg. Co., Milwaukee, Wis.

Equitable Building, LOS ANGELES

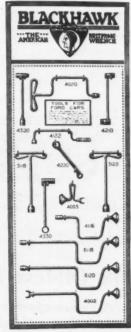
With Offices at
Transportation Building, 111 Montgomery Street,
CHICAGO SAN FRANCISCO 616 Pioneer Building, SEATTLE



COMBINATION SET No. 8



COMBINATION SET No. 4



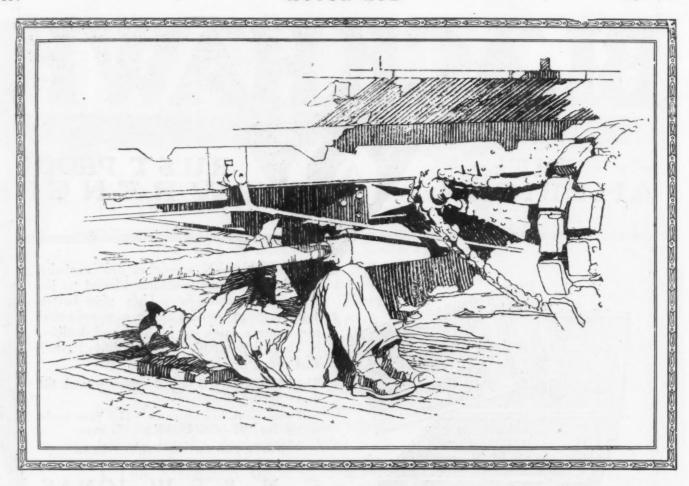
DISPLAY BOARD No. 400 For Fords



COMBINATION SET No. 6



COMBINATION SET No. 2



There Are Two Kinds of Chassis Lubrication

ONE kind relies on grease cups and invites neglect. Which means nothing more serious than 20 or 30 bushings suffering for want of lubrication—nothing of greater consequence than premature wear and breakdown resulting from the invasion of friction and corrosion.

Nothing more or less, in other words, than a truck "scrapped" long before it has served its full term of usefulness.

All for Want of Attention.

But it's the kind of attention that drivers and maintenance men are not particularly keen about—for it is a hard, messy, irritating job. And it's the kind of attention that is wholly unnecessary when Oil-less Bushings are installed at these points.

Bound Brook (graphite and bronze) and Nigrum (impregnated wood) Oil-less Bushings are self-dependent. Whether attended to or not they will always be provided with sufficient lubricant to keep things running smoothly and silently. They will last far longer in the face of inevitable negligence than any other bushings of whatever type or make.

They are the best assurance you can have that the truck you make, sell or use will give a long period of service, with permanent freedom from the costly results of neglected lubrication. We make Oil-less Bushings only "to order" for those manufacturers who use them. Literature or other information upon request.

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.



Bound Brook Oil-less Bearing Co.

Specialists in the manufacture of Oil-less Bushings for more than a third of a century

Bound Brook

New Jersey

Detroit Office: 1723 Ford Building

When Writing to Advertisers, Please Mention Motor Age







REPLACEMENT **SPRINGS**

The insistent demand for the same quality of springs for replacement that we have for years supplied to the manufacturers has induced us to enter this field.

Our six spring plants represent the greatest spring manufacturing facilities in the world, the most up-to-date methods, long experience, proven quality.

> Write for our new catalog and details of our Replacement Spring Proposition for Distributors and Dealers

> > THE

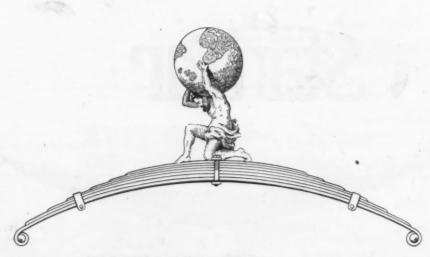
OMPAN

Stan-Par Axles Stanweld Rims

Springs Bock Bearings Tubing Tubular Parts

Rod Assemblies

Executive Offices—Cleveland, Ohio



THE spring bears the responsibility of the entire automobile world.

On it depends the comfort, the very lives, in fact, of those who ride in motor cars.

On it depends, too, the life and upkeep of the automobile. For engine, mechanical parts, and tires are all vitally affected by spring action.

How important then, that Harvey Springs be used *always*.

This is a case where good judgment says use the best.



Write for free Harvey Book of Springs containing specifications for all springs.

Harvey Spring & Forging Co.
1005-17th Street, Racine, Wisconsin

Spark Plugs

To many, a spark plug is just a spark plug. But mechanically, it is a mighty interesting and important part of an automobile. While it operates on the same principle as a lightning rod, it carries its miniature strokes of lightning—sometimes thousands a minute—into the engine instead of the earth.

Because the terminal nut is perfactly knurled, or roughened, it may be tightened with the fingers. Pliers often cause breakage.

This core nut keeps the center electrode tight at the shoulder below, preventing leakage. The little disc spring here takes up the expansion by heat.

The Sterling core is big to defeat easy breakage, by heat or accidental shocks. Being large, it presents an unusually large insulating surface inside the explosion chamber.

The under side of the core shoulder gives a level seat in the shell. The conical fit of the gland nut further prevents leaning.

Monel Metal forms the entire length of the electrode. It is non-corrosive and heat-proof.

Sterling shells fit standard socket wrenches. The lower threads are turned off to make easier starting the plug into the cylinder.

This side electrode, which carries the current past the spark gap into the "ground" is cold swedged into the shell, proof against turning sidewise.

A copper ferrule inside this gland nut makes possible a snug fit when the core is locked in place, and conducts heat rapidly to the cylinder jacket.

Sterling Special 7/8-18 Plugs for Buick and Chevrolet cars have an exclusive Sterling Design terminal nut, so fashioned as to serve for either car by simply reversing.

This narrow neck portion of the nut is designed for the ordinary spring clip terminal.

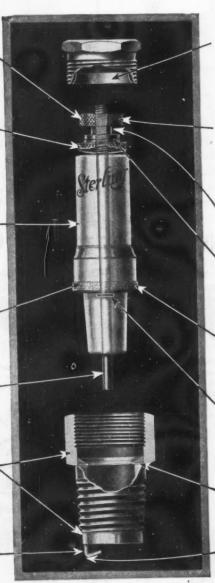
Here the contact is flat, insuring tight terminals and better electrical contact.

Here is the effective preventative against leakage in Sterling Plugs. This pliant asbestos washer is sandwiched between copper as shown in section through the cut-out shell below.

This little shoulder is an integral part of the electrode. It is cemented against the core, making it leak-proof.

This asbestos washer is heatproof and leak-proof. The copper helps conduct the excess heat to the cylinder jacket.

Excess cylinder oil drips from here — the lowest point — thus keeping the spark gap free from shorting.



Lockwood-Ash Motor Co.

1956 Main Street Jackson, Mich.

SEPARABLE

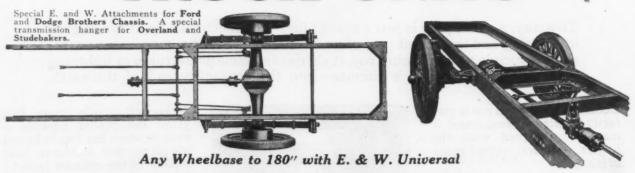


CLEANABLE

When Writing to Advertisers, Please Mention Motor Age

(59)

E. & W. Internal Gear and Worm Drive TRUCK UNITS



Make a 1, 2 or 3 Ton Truck of Any Car

The E. & W. Universal Attachment is furnished with a 14-foot one-piece frame, together with a short propeller shaft with double universal joints suspended from center of frame by an adjustable roller-bearing hanger. Any wheelbase up to 180 inches can be obtained by fitting shaft of old car into the E. and W. front universal joint and by cutting off or regulating the frame accordingly. This is an exclusive E. & W. feature.

Our dealer proposition is unusually attractive. Write for details.

Unit, Cab and Body in One Purchase





COE-STAPLEY Peteler

MORE EFFICIENCY POINTS

Short Stroke (car overhang does not interfere),
Rapid Lifting Motion, No Danger Point—No
Back-Breaking Stooping Effort—Compact—Light
—Simple—Strong.

Get the Details Now

Superior Merit Point No. 3

With This Telescopic Handle Leaning Over Is Unnecessary and Leverage Is Greatly Increased

In previous advertising we have featured the design of the Peteler Jack which makes lifting, lowering of the car and removal of the jack, all processes reduced to the finest point of ease.

This telescopic handle is a big contributing feature to the operation. It is made in two sections, which may be instantly connected or taken apart. Occasionally a short handle is necessary. Usually the extension is essential.

After raising the car, a slight twist of the handle disengages the handle. It is then used to "kick down" the lever which reverses the jack to the "step down" movement. After the wheels are back on the ground, a slight upward movement of this handle drops the ram back to normal, allowing the jack to be pulled out by the handle.

Dealers will make a sale out of practically every demonstration. Car owners are needing and looking for a jack that will raise 3,000 pounds— and do it without stooping—and without touching the jack.

This describes the Peteler Jack—a little, sturdy, compact bunch of ingenious invention, with but \$6.00 as its selling price.

Your discounts make the five minutes spent in showing it well worth while.

COE-STAPLEY MANUFACTURING CORP.

Factories, Bridgeport, Conn.

Executive Offices

136 Liberty Street, New York

DEALERS

If your jobber perchance cannot give you the details we will furnish them.

A Good Motor Car—And the Public Knows It

IN most Oakland Sensible Six sales, the car is half sold before the buyer talks with the Oakland dealer or his salesman.

These buyers have confidence in the Oakland Sensible Six. They have had convincing proof of its ability and thrift.

They have friends who own and drive Oaklands, and from them, they have heard of efficient and dependable performance, combined with economy of operation and maintenance.

Thus, more than 100,000 enthusiastic Oakland Sensible Six owners are continually stimulating Oakland sales, which Oakland dealers have little trouble in closing.

And the confidence that the public has in the Oakland Sensible Six extends to the stable and resourceful company that builds this sturdy car and to the men who sell it.

Public confidence, in fact, is an asset of every Oakland dealer. It is one of the foundations of a profitable business.

Perhaps you are looking for such an opportunity as the Oakland Sensible Six offers to automobile merchants who value such public confidence and are wise enough not to violate it.

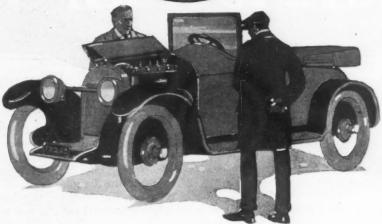
If you are, write or wire us. There is still some good Oakland territory open.

The popularity of the Oakland Sensible Siv is due in no small measure to the unusually high returns it gives from gasoline and tires—from 18 to 25 miles from a gallon of gasoline and from 8,000 to 12,000 miles from tires.

OAKLAND MOTOR CAR COMPANY, Pontiac, Mich. Touring Car, \$1075; Roadster, \$1075; Sedan, \$1650; Coupé, \$1650 F.O. B. Pontiac, Mich. Additional for wire wheel equipment, \$75.00



OAKLAND SENSIBLE SIX OMING FOUNDRY & MACKING MILLIAMSPORT DENNA



Lift the Hood and say "Lycoming Motor"

Your prospect is interested. Now is the time to hammer in the idea of reliability which is the foundation of Lycoming construction and the secret of Lycoming suc-

Take one sound feature after another and hammer it in. Begin with the to him that the car he

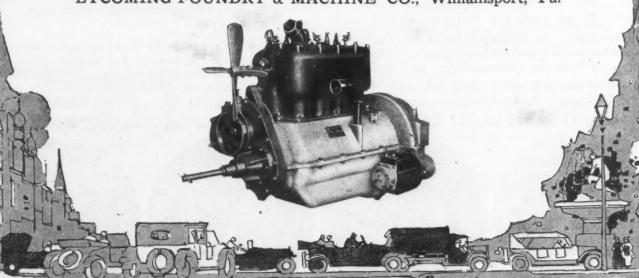
cylinders. Tell him what skill has been used in the casting of the close grained gray iron bloc. Explain to him with what care the cylinders are bored and ground.

Go through the whole catalog of Lycoming advantages. You will prove

wants is the car with a Lycoming motor in it. It will give him the reliability, power and long service he wants from a car.

Model K, 4 cylinder, L-head, 3 point suspension. Bore 3½", 5" stroke. S.A.E. h.p. 19.6, 30 B.H. P. at 1450 R.P.M.

LYCOMING FOUNDRY & MACHINE CO., Williamsport, Pa.



THE MOTOR FOR THE DISCRIMINATING CAR BUILDER

"Spins'em off" -No nut or bolt too hard to reach



Takes All Size Sockets

Sockets

Why undergo
the troublesome, timedestroying inconvenience of
"fussing" with hard-to-get-at nuts

and bolts on motor or body when a Billmont
Master Wrench with its curved "nose" will slip into
heretofore inaccessible places, take a bulldog grip on the nut
or bolt, and by merely twisting the handle, spin off the hardest of
them. Once on the nut it will not slip because the knurled outer tube
gives you a firm grip with one hand while you twirl off the nut with sliding handle.

BILLMONT WASTER

The Wrench that Spins'em off "

Takes the place and does the work of a dozen "special" wrenches and the movable handle slides back or forth, so at no time need wrench be taken off the nut to complete a turn.

Even the fourth connecting rod nut on Fords is no task for Billmont, while such "hard ones" as cylinder bolts on Wintons, radiator stud bolts on Chandlers, rear motor support bolt on Oldsmobiles, and grinding fourth valve on Fords are reached handily and with surprising results.

Billmont is an "all in one" wrench—made 13½ inches long, of the finest steel, heat treated and ground, every inch a remarkable tool. A set complete with 3 sockets of more than usual sturdiness, I adapter (so you can use any standard size socket), Ford valve grinder and I screw driver; sells at retail for \$10.00.

Billmont differs in every way from other wrenches—saves you time, trouble and worry. Sooner or later you will use a Billmont—order one now—if a dealer, order will be shipped (at dealer's price) through your jobber.

Edgar C. Guthard Co., 361 E. Ohio St., Chicago, III. Branch Offices: 1201 Plymouth Bldg., Minneapolis; 207 W. 76th St., New York; 339 Phelan Bldg., San Francisco.



Actually spinning off 4th connecting rod nut on Ford.



Spinning off cylinder head bolts



Tightening Studebaker differential bearing bolts or carrier nuts.



Reaching easily radiator stud nuts

When Writing to Advertisers, Please Mention Motor Age

Tis he can

The wate to lo Won

The really canva stitched

The Co

"The Seat Cover De Luxe"



Campbell Fan Belts



This is the famous Latigo Fan Belt for Ford Cars. It is made of genuine latigo leather and is impercious to heat, oil and water. Friction cannot burn it, wear cannot harden it and it will not stretch or slip.



The new Reinforced Latige Fan Belt is made of special waterproof ducking, scientifically folded and stitched to latigo leather with rows of heavy thread stitching. Wonderfully durable.



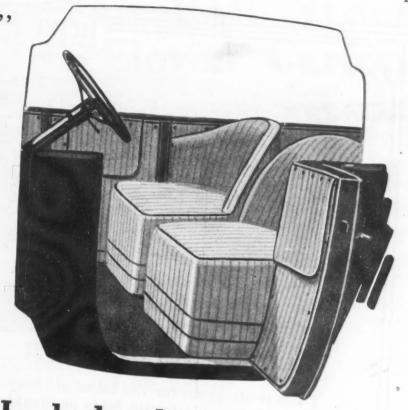
The Campbell Corded Fan Belt for Ford Cars is a really non-stretchable belt. It is made of waterproof stitched to leather for pulley facing. Will not stretch or run off.



The Campbell V-Shaped Latigo Belt successfully meets the demand for a belt of this kind. It is made of three plys of heavy Latigo and held together with leather thongs. There is no chance whatever of ripping.

Dealers:

There is a wonderful sales value in these belts. Write for our proposition and complete catalog of other guaranteed accessories.



Include this Accessory in your Sales Plans

Hundreds of motor car and accessory dealers throughout the country are finding it highly profitable to push Campbell Detach-

This better seat cover finds a ready market among motorists who know and appreciate the best in all things.

The finest of motor fabrics, perfect fit, broad heavy binding, reinforced seams and the special Campbell-Carr Durable Fasteners are but a few of the more prominent reasons.

Campbell Detachable Upholstery is profitable from another standpoint. It ties up no money in expensive stocks, as it is sold entirely from a swatch booklet. Our immense manufacturing facilities insure prompt deliveries.

This Seat Cover de Luxe is one of the most profitable accessories you could handle. Every motorist is a prospect. Every sale brings

Write for our proposition. Ask also for our complete catalog of guaranteed automobile accessories.

The Perkins-Campbell Company

625 Broadway

Cincinnati, Ohio



When Writing to Advertisers, Please Mention Motor Age

"Spins'em off" -No nut or bolt too hard to reach



Takes All Size Sockets

Pat. and Pats. Pending Why undergo the troublesome, timedestroying inconvenience of

"fussing" with hard-to-get-at nuts
and bolts on motor or body when a Billmont
Master Wrench with its curved "nose" will slip into
heretofore inaccessible places, take a bulldog grip on the nut
or bolt, and by merely twisting the handle, spin off the hardest of
them. Once on the nut it will not slip because the knurled outer tube
gives you a firm grip with one hand while you twirl off the nut with sliding handle.

BILLMONT WASTER

"The Wrench that Spins'em off"

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Even the fourth connecting rod nut on Fords is no task for Billmont, while such "hard ones" as cylinder bolts on Wintons, radiator stud bolts on Chandlers, rear motor support bolt on Oldsmobiles, and grinding fourth valve on Fords are reached handily and with surprising results.

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Edgar C. Guthard Co., 361 E. Ohio St., Chicago, Ill. Branch Offices W. 76th St., 1

Branch Offices: 1201 Plymouth Bldg., Minneapolis; 207 W. 76th St., New York; 339 Phelan Bldg., San Francisco.



Actually spinning off 4th connecting rod nut on Ford.



Spinning off cylinder head bolts on Winton



Tightening Studebaker differential bearing bolts or carrier nuts.



Reaching easily radiator stud nuts on all cars.

When Writing to Advertisers, Please Mention Motor Age

"The Seat Cover De Luxe"



Campbell Fan Belts



This is the famous Latigo Fan Belt for Ford Cars. It is made of genuine latigo leather and is impervious to heat, oil and water. Friction cannot burn it, wear cannot hurden it and it will not stretch or slip.



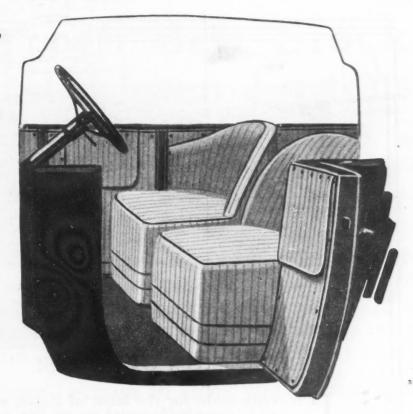
The new Reinforced Latige Fan Belt is made of special waterproof ducking, scientifically folded and stitched to latigo leather with rows of heavy thread stitching. Wonderfully durable.



The Campbell Corded Fan Belt for Ford Cars is a really non-stretchable belt. It is made of waterproof canvas interwoven with a series of eight cords and then stitched to leather for pulley facing. Will not stretch or run of.



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Include this Accessory in your Sales Plans

Hundreds of motor car and accessory dealers throughout the country are finding it highly profitable to push Campbell Detachable Upholstery.

This better seat cover finds a ready market among motorists who know and appreciate the best in all things.

The finest of motor fabrics, perfect fit, broad heavy binding, reinforced seams and the special Campbell-Carr Durable Fasteners are but a few of the more prominent reasons.

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This Seat Cover de Luxe is one of the most profitable accessories you could handle. Every motorist is a prospect. Every sale brings in better than usual returns.

Write for our proposition. Ask also for our complete catalog of guaranteed automobile accessories.

The Perkins-Campbell Company
625 Broadway
Cincinnati, Ohio

Dealers:

There is a wonderful sales value in these belts. Write for our proposition and complete catalog of other guaranteed accessories.







IS HOME FROM OVERSEAS!

It is ready again for the labor of Peace, eager for its work of plowing and harrowing fertile fields or breaking the stubborn acres of virgin land. After strenuous years of hauling the U.S. and Allied artillery, the "Caterpillar" is ready again to haul trains of farm produce to market, to haul logs to the mill—to transport ore across mountain and desert trails—to build and maintain highways everywhere.

And from overseas thousands of American boys are returning who operated these machines at the Front; they know how "Caterpillars" did the work and were always dependable no matter what the conditions might be!

On every Front where Allied Armies fought, Holt Tractors—"Caterpillars"—were there. They made good.

In farm work the year 'round, on the largest industrial projects, "Caterpillar" owners and operators are always enthusiasts; they know "the world's greatest and best known farm tractor" is always dependable.

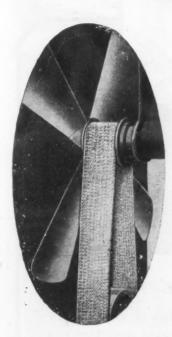
With its years of leadership in farm and road work, its "Distinguished Service" throughout the whole world war, the "Caterpillar" is years ahead of all other makes. A "Caterpillar" agency obtained now insures a permanent, profitable business for dealer or distributor. Inquiries invited in regard to available territory.

There is but one "Caterpillar"—Holt builds it This name is the exclusive Holt registered trademark.

THE HOLT MANUFACTURING COMPANY, Inc. PEORIA, ILLINOIS

Factories: Peoria, Ill., Stockton, Calif. New York Office: 50 Church St.

"CATERPILLAR"



Your Fan Belt Stock in Just Eleven Cartons

You want a simple method by which to order fan belts. You want an easy way to handle and sell them. You want the advantage of small investment with fast turnover and quick profits. All this—plus car-owners' satisfaction—is offered in Gilmer Woven Endless Fan Belts, by reason of our system of classification of belts, according to cars, into eleven groups, with each group packed 25 belts to a carton. (Cars in same group use same belt.)

With these eleven cartoned groups in stock you are ready to supply fan belts for all the 42 cars here listed:

Group 1 Ford National Stearns-	Year 1911-1916 1916-17-18	Model T Highway Twelve	Group 6 Auburn Dodge Empire	Year 1918 1915-16 1916-17-18	Model Continental Motor 45-50-51
Knight Group 2 Ford	1917-18	T	Maxwell Paige Studebaker	1914 1916-17-18 1916-17-18	604A 6-38 and 6-39 4s. and 6s.
Group 3	1915-18	84-87-41	Velie	1916-17-18	Six
Buick	1914	B36-B37-B38- B54-B55	Group 7 Buick	1918	E44-E-45-E46-E47- E-49-E50-Late Type
Buick	1915	C24-C25-C36- C37-C54-C55			E-19-E50-Late Type
Buick Overland	1916 1916	D54-D55	Group 8		
Overland Chandler Dodge	1917-18 1916-17-18 1917-18	90 & 90 Country Club All Models	Maxwell Mitchell	1916-17	"25" C40 and (C42—1916.)
Mercer Buick Truck	1916-17-18-19	2272 & 2273 D4-G. M. C. Motor	Group 9		
Group 4			Maxwell	1918-19	"25"
Briscoe Dort	1916-17-18-19 1915-16-17	4-24 All Models	Group 10		
Grant Hollier	1915-16 1917-18	T and V Six	Kissell Kissell	1917-18-19 1919	"Six" "Custom Built"
Group 5 Hal		Twelve	Group 11		
Hudson Moon	1916-17-18 1918	Super-Six 636	Buick	1916-17	D44-D45-D46-D47
National	1917-18	Six	Buick	1917	D34-D35
Overland Saxon	1916-17-18 1916-17-18	83 and 84 Six	· Buick Buick	1918 1918	E34-E35 E44-E45-E47-
Willys-			20.00	2020	E49-E50
Knight	1916	84			Early Type

Consumer's Price, 50c to \$1.00. Other models on request.

The Gilmer Endless Woven Belt is the fan belt wanted by your customers for replacements. It is the same belt supplied as regular equipment with their cars when bought.

Continuous support of your sales is assured by our advertising in national mediums, headed by The Saturday Evening Post.

WRITE US FOR PRICE LIST AND ORDER OF YOUR JOBBER

L. H. GILMER COMPANY, Philadelphia

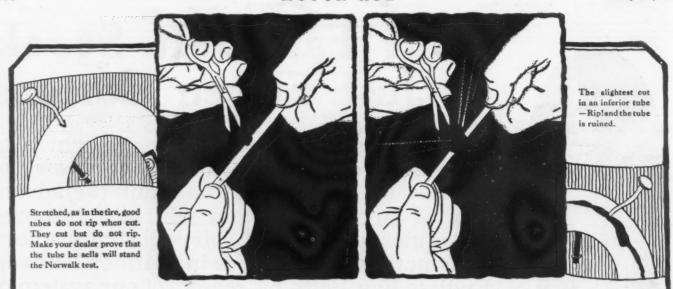
Makers of Woven Endless Belts, Woven Automobile Specialties, Belting, Webbing and Tape for all purposes.

When Writing to Advertisers, Please Mention Motor Age

Gilmer Transmission Lining for Ford cars, complete with rivets, consumer's price per set....\$1.50

Gilmer Tire Straps, width ¼ to 1 inch; length 2 to 4 feet, consumer's price, 50c to 75c





The Scissors Test

Take test strip ¼ in. by 3 in. Stretch to 9 in. or three times its original length. Cut on the edge with the scissors. The cut should not be more than ⅓ in. across the sample. If the strip tears apart the rubber is inferior.

Nothing--Something--Everything

- 1. The scissors test costs nothing. It shows that Norwalk Tubes, red and gray, do not rip. It shows that the cut from puncture or blow-out can always be repaired.
- 2. You buy a Norwalk floating stock Tube. That's something. You learn to know it as the highest quality tube made.
- 3. And then you look for everything, for a complete proposition. You ask whether there is a casing as good. There is—a Norwalk cord or non-skid fabric with handsome black tread and snow white sidewalls.

NORWALK TIRE & RUBBER CO., NORWALK, CONN.

Makers of Casings, Cord and Fabric; and of Tubes, Red and Gray

Export Office: 100 Broad Street, New York

DEALERS If the tubes you are now selling do not meet the Norwalk scisone of a series in which we are telling the public how to test tubes before they buy.

NORWALK TUBES and CASINGS





With Offless Bearings

Rear View with cover removed, allowing easy access to differential bearing adjustment, and showing improved housing which is welded and riveted, assuring maximum strength and minimum weight.

A Sturdy Differential-**Another Proof**

Spacke Axles are proved better in every feature of design, material and construction.

The spiral tooth differential, for instance, is standardized as to size, but its design gives strength, quiet smoothness in action, saves power, and makes it easily adjusted. The chrome nickel axle shafts indicate the better materials. And the fact that the pressed steel housing is both welded and riveted is an instance of the many superior details of construction.

With its elimination of ten dirty, hard-to-reach grease cups by the use of oilless bearings, and many other features, it will pay any buyer to look for Spacke value in the axle of his car.

Every engineer, manufacturer and salesman should know the details of this great organization and its product.

The 1919 Spacke Specification Folder is yours on request

THE SPACKE MACHINE & TOOL CO.

Makers of Spacke Axles, Spacke Motors & Automotive Parts.

~ ~ Indianapolis ~U~S~A~ Factories & Offices

When Writing to Advertisers, Please Mention Motor Age



The Leading New York Service Stations Use S. & P. Brand Valve Grinding Compound

New York Endorses S. & P. Compound

You can draw your own conclusions from the fact that most of the leading New York Service Stations are using

S. & P. Brand Valve Grinding Compound.

They have chosen S. & P. brand because they have found it to be the most efficient grinding compound on the market today.

Their time consumed in grinding valves has been greatly reduced through the use of S. & P. Brand and the result is much more satisfac-



"Efficiency" is THEIR slogan, and if it's going to be yours, use

S. & P. Brand Valve Grinding Compound

and remember to ask for the yellow can with the trade mark shown below.

S. & P. Compound retails at 40 cents for a 5 oz. can. It is cheaper, quicker and more sat-

isfactory to work than compounds selling at 20% higher. If your jobber cannot supply you send for price lists and discounts.

Use the best.

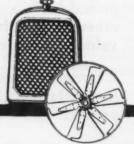
S. & P. Manufacturing Company

163 Columbus Avenue

New York

Sparton Motorhorns-Standard equipment on 40 of the leading motor cars of the country. The ya-hoot-a of Sparton's warning call is heard wherever tire tracks lead.

Sparton Cooling Unit-Fansand Radiators-designed and built to work together, giving a maximum cooling ability. Sparton patented radiator fan moves the greatest volume of air at the highest speed and with the least consumption of power.

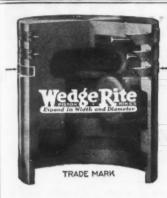


Sparton Gasoline Vacuum System-Insures a constant supply of fuel at the carburetor, regardless of grade or speed. Raised fuel 22 feet above gravity level in test.



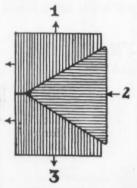
Write Us For Information

The Sparks-Withington Company Jackson, Michigan





Every Dealer Garageman Should Know WedgeRite Rings



The Wedge principle of this Piston Ring is shown in the accompanying drawing-and its superiority, measured by its ability to expand in width as well as diameter, means profitable sales for the Dealer.

When you show your customer the Wedge-Rite Piston Ring and demonstrate just how it works-showing him the center wedge ring which always holds the other two sections firmly against the cylinder walls and

WedgeRite Piston Ring Company, Inc. Sales Office, 278 Jefferson Ave. East, Detroit, Mich.

Factories:

Plattsburg, N. Y. Montreal, Que. the width expansion feature that adjusts itself to worn grooves, he will quickly recognize WedgeRite superiority.

No piston slapping or ring knocks and no chance for oil to work into the combustion chamber with consequent fouling of spark plugs-WedgeRite Piston Rings insure permanent, maximum efficiency.

If you are looking for more profits and the foregoing looks like a real business proposition, you are one of the men we want to hear from. We are after the successful dealer who is always endeavoring to better himself.

Write for full information today.



CROSS SECTION OF RING 1. Section pressing outward and upward.

2. Spring section of ring. 3. Lower outward and down-ward section,

wrappings extend from top to botunbreak-3/32 inch

We Make Stronger Claims For This Hill 3-A Spark Plug Than Any Other Plug Manufacturer Dare Make—Dealers Can Sell on the Proved Assertions.

SPARK PLUGS

Terrific endurance tests have proved our basic design patents correct. This plug is an original one-piece mica type. It has no gaskets or bushings to complicate and weaken. The center electrode is tightly wedged in mica. It cannot short-circuit. Cap electrode is slotted and carbon is instantly consumed through in-rushes of gases at each violent explosion. There is no place for oil or carbon in its anatomy. It will not leak compression and no "rough house" motor can break it. It will not rust.

We have tried every form of punishment to find weak points. We took two years to do this. Our idea of a spark plug spelled "Perfection" and here it is, as sturdy in its function as is the steel frame of the truck.

You dealers hunt up some old reprobate of an engine—one with the reputation of a "spark plug killer." Try the Hill 3-A Spark Plugs on its temper—as long as you please. Then you will have the answer that we have been getting for years.

What will your car, truck and tractor customers think of this spark plug service?

Ask yourself—and then stock up. Big profits in your sales.

Ask yourself-and then stock up. Big profits in your sales.

Hill 3-A Spark Plugs Make Good-Or We Do Price \$1.25 each

Hill Insulating & Manufacturing Corp. 515 W. 42nd Street New York City

TRUCKS RIANGLE

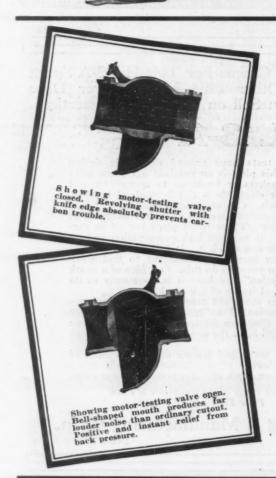
In those lines of business particularly where unusual hauling conditions must be met, Triangle Trucks are steadily building a reputation for efficiency and durability.

Triangle dealers know what their truck will do. They know it is an honestly built truck that meets and overcomes the tough problems in transportation. They sell Triangles with perfect confidence in their performance.

And they are doing a mighty nice business that is constantly on the increase. We can take care of a few more dealers. Details will be sent upon request. A wire or letter will bring full informa-11/2 and 2-Ton TRIANGLE MOTOR TRUCK CO. Models ST. JOHNS, MICHIGAN tives 381 Fourth Ave., New York City New England Distributors Eugene F. Lally & Sons Boston, Mass.

Eastern Representa-

Triangle Motor Sales Co.



Better! It is so simply constructed, so strong, so easily installed, so impervious to hard knocks and adverse conditions—its voice is so loud, clear, penetrating and truth telling, that it is indispensable on all cars whose drivers want to know at all times how their engines are performing. Guaranteed to last the life of the car without sticking, slowing up, carbonizing or giving trouble of any kind. **Dealers* are doing a profitable business with Goodrich Motor Test-Dealers are doing a profitable business with Goodrich Motor Testing Valves. Write for terms and particulars. Ford Size—List Price \$1.50—including Pedal, Pulley and Cable. Larger sizes at corresponding prices.

GOODRICH-LENHART MFG. CO., 419 V Factory, Hamburg, Pa. 419 Widener Bldg., Philadelphia, Pa.

OR TESTING VALV

BUILT AS A BODY

SHOULD BE BUILT



A few of the many BUICK Dealers who sell and fully endorse Johnson Automo-bile Locks.

Endorse Johnson Automobile Locks.
Little Rock, Arkansas, E. M. Rowe Company.
Sacramento, California, J. D. Lauppe.
Atlanta, Georgia, J. M. Smith Company, D. M. Lyon Company.
D. M. Lyon Company, D. M. Lyon Company.
Chicago, Illinols, James Levy,
Southside Buick Sales Co.
Charles Lang & Bros. Co.
Indianapolis, Ind.,
Huff Buick.
Baltimore, Maryland,
Auto Outing Company.
Detroit, Michigan,
Tollotte Buick Co.,
Minneapolis, Minn.,
Pence Auto Company.
St. Paul, Minn.,
Roller Motor Car Co.
Buffalo, New York,
Klepfer Brothers.
New York, N. Y.,
Buick Motor Company,
Kansas City, Mo.,
Hiatt Motor Company. Kansas City, Mo., Hiatt Motor Company. Buick Motor Company. St. Louis, Missouri, Hurd Buick Company. Oklahoma City, Okla., Oklahoma City Buick Co. Tulsa, Oklahoma, Forster-Davis Motor Corp.

Pittsburg, Pa., Keystone Buick Company Keystone Buick Company
Philadelphia, Pa.,
Markwell-Wilkie Co.
Cleveland, Ohlo.,
Ohio Buick Company.
Cincinnati, Ohlo.,
Leyman Buick Company.
Columbus Buick Company.
Columbus Buick Company.
Dayton, Ohlo.,
Dayton Buick Company.
Conada

Canada McLauglin Carriage Co. Ltd.

Future advertisements will announce the names of many other prominent motor car dealers who sell Johnson Locks for Dodge, Cadillac, Chandler and other makes of cars.

LIVE SELLER FOR EVERY DEALER

Prospects in your territory for this beautiful, dashing body for Fords can be counted by the dozens. Some good territory is still open. Order a sample. Put it on display and see how much enthusiasm it will create. Big profits and quick sales will immediately follow.

The REMO RACEABOUT, Model SS, is positively the

latest-newest in design and is constructed for service and satisfaction to the owner. It is made of heavy sheet steelhard lumber, glued and screwed. The trimming is the best ever. Spring back—double box spring cushion 9 in. deep. Leg room and seat gives driver an exceptionally comfort-

Leg room and seat gives driver an exceptionally comfortable position.

The wind shield is ventilating and adjustable—not like ordinary shields made for small bodies. REMO shields are made like those on higher priced cars and are extraordinarily high class. Top is military style. Made of mohair complete with side curtains. The BIG feature of REMO Model "SS" is the mounting. This model is so designed as to do away with all red tape in attaching to the chassis. No change in dash. No block needed for lowering steering post. Everything complete and ready to slip on like a regular Ford body. This Remo Raceabout body is the classlest body ever built for the Ford.

DEALERS

DEALERS

Write for Proposition

AUTO REMODELING CO.

1501 Michigan Avenue CHICAGO, U. S. A.

ONE HALF CENT per SQUARE INCH

For a Bulk Roll of ZIP (7, 776 Sq. In.)

NOTE: The roll containing 7,776 sq. in. weighs about 20 pounds and is equivalent to a gross of cartons of the dollar size Zip.

Bulk roll containing 3,888 sq. in. %c per sq. in. Bulk roll containing 1,944 sq. in. %c per sq. in.

Get your pencil and figure it out.

Now, figure on the following facts:

1—Instead of just breaking even on labor expense in applying ordinary patch material you can actually make big profits by using Zip, because—
2—Zip vulcanizes WITHOUT HEAT, cement or glue;
3—A nail puncture or a two-foot slash can be patched in ONE MINUTE with Zip and your customer is on his way happy. The air pressure and the road friction do the vulcanizing while he rides and while your bench man is busy at another job;
4—You don't need to promise a job "tomorrow" if you use Zip—you can do it like the shoe man—"while they wait."



GUARANTEE

IF A ZIP PATCH, WHEN APPLIED PROPERLY, SLIPS OR LEAKS IN THE SLIGHTEST DEGREE, IN ANY WEATHER, WE WILL REFUND YOUR MONEY GLADLY—AND WITH NO "IFS" OR "ANDS."

Heat burns the rub-176 Punctures—Run 1200 Miles — 60 lb. Pressure—No Leaks. ber — and the customer's confidence.

DEALERS: Zip also comes in handy dollar cartons. Liberal discount. It sells itself over and over again.

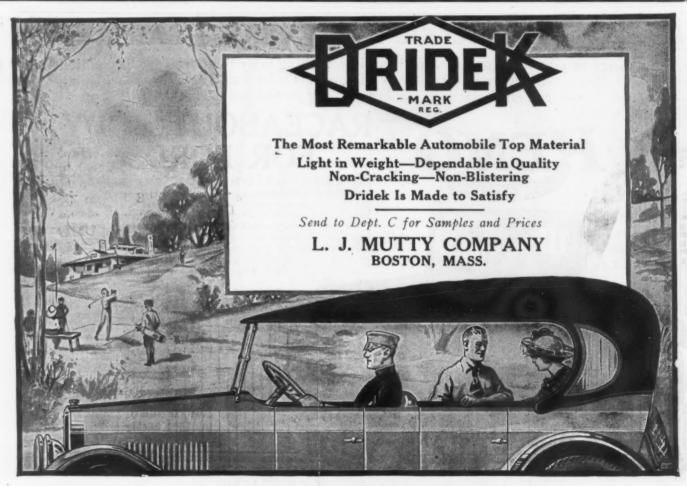
ZIP WILL—WILL— WELL, Read the Guarantee.



2 Ft. Patch — Run 1500 Miles — 90 lb. Pressure—No Leaks.

JOBBERS, DEALERS, GARAGEMEN and VULCANIZERS, write at once. Better yet, enclose a check for a dollar carton, a dozen cartons or for a roll.

ONE MINUTE VULCANIZING COMPANY, Rosedale, Kans.



When Writing to Advertisers, Please Mention Motor Age

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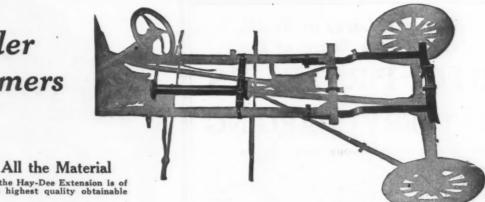
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Every Dealer Has Customers for This



in the Hay-Dee Extension is of the highest quality obtainable

Hay-Dee Extension for FOR

Makes a practical delivery car chassis out of a standard Ford without drilling a hole.

The Hay-Dee Extension solved the ambulance problem for the Government. All the later Ford Ambulances sent overseas were 115-in. wheelbase

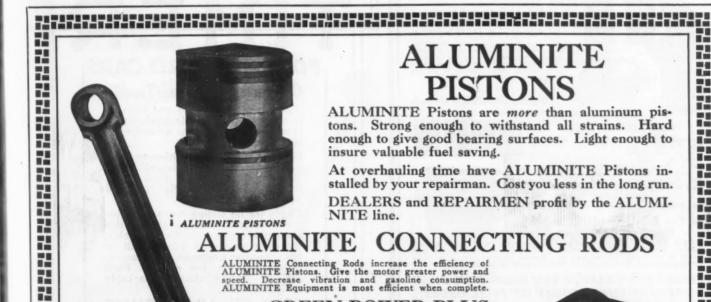
15-In. \$55 Making a 115-inch wheelbase

ALUMINITE Connecting Rods

MORE THAN 5,000 IN USE BY SATISFIED CUSTOMERS

30-In. \$60 Making a 130-inch wheelbase

HAYES-DIEFENDERFER CO., Inc., 1876 Broadway, New York



ALUMINITE PISTONS

CONNECTING RODS

ALUMINITE Connecting Rods increase the efficiency of ALUMINITE Pistons. Give the motor greater power and speed. Decrease vibration and gasoline consumption. ALUMINITE Equipment is most efficient when complete.

GREEN POWER PLUS Cylinder Head

Sold on 30-Day Trial Gives additional water space around the spark plug, gained by locating the plug directly over the center line of your cylinder. The result is additional power and pull for FORD PASSEN-GER CARS and TRUCKS.

WRITE GREEN ENGINEERING CO.

34 South St. Clair Street Dayton, Ohio



Green Power Plus Cylinder Head

When Writing to Advertisers, Please Mention Motor Age

Garages, Large or Small, Can Get a Share of the

BIG PROFITS

BATTERY CHARGING

This big money-making business is open to every live garage man. Wherever cars are driven, there are batteries to be recharged and now, with all new Fords coming out with storage battery equipment, the opportunity is even greater. Get in the game, get the big profits that battery charging pays. No other part of your garage business pays anything like as big profits. With HB Equipment, it costs you only 12c to 15c to charge a battery, and the customer pays 75c to \$1.50. Compare that profit with profits from other lines of your business. Battery charging can be made to pay from \$100 to \$400 a month. The business is at your door—go after it!

An HB BATTERY CHARGER for Every Size Business

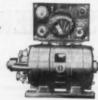
You can get an HB Charger in any size you need. All HB Chargers are sturdy, dependable and absolutely reliable. Built of finest materials obtainable. Nothing to burn out, no expensive renewals or repairs. Plain, honest, profit-producing service 24 hours a day. No electrical or mechanical knowledge required to install or operate. No attention except occasional oiling. Uses power from any city lines. Big, quick, clean profits, easily made.

CHOOSE THE SIZE YOU NEED

HB 500-Watt Charger

Recharges 1 to 7 6-volt batteries or their equiva-lent at a time. Charger is 27 in. long, 26 in. high, weighs 280 lbs. Furnished complete with clear-black electrical slate switchboard, with mount-ings of ammeter, field rheostat, voltage lamp, two controlling switches. A big money-maker for a small battery business.

\$15 CASH



9 Monthly Payments of \$20 each



HB 16-Battery Charger

Recharges 1 to 16 6-volt batteries or equivalent in 12 or 24-volt batteries at once. Motor 1 KW capacity. Operates on 2 or 3 phase current only. Furnished complete with 2 independent charging panels, each with capacity of 8 batteries. A splendid machine for every live, energetic garage owner wishing to get big profits.

\$57 CASH

10 Monthly Payments of \$23 each

HB 32-Battery Charger

Recharges 1 to 32 6-volt batteries or equiva-lent at a time. Motor 2 KW capacity. Oper-ates on any current. Four separate charging lines, each capable of charging up to 8 bat-teries. Permits individual attention to bat-teries on charge. Ideal equipment for big ga-rage or battery service station. Will make as high as \$250 to \$450 a month clear profit.

\$57 CASH



10 Monthly Payments of \$50 each Sold on Trial Under HB Absolute Money-Back Guarantee

All HB Equipment is sold under our absolute guarantee of complete satisfaction. If not satisfied after using any HB Equipment 10 days, you may return it and receive all you paid us. Monthly payment plan is an additional guarantee. Machines pay for themselves out of earnings.

SELECT THE CHARGER YOU NEED-MAIL FIRST PAYMENT CHECK TODAY ON TRIAL ORDER

HB Chargers Are the Motor Generator Type

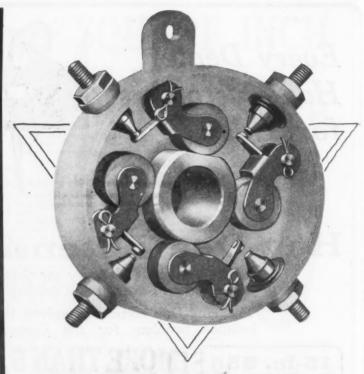
There are many charging appliances on the market which, on first impressions, look good. Investigate the operating expense and the cost of parts that wear out or burn out, causing endiess trouble, worry and needless expense. It should mean something to you that 75% of all HB Motor Generator Chargers sold replace other charging appliances. Remember, it snot first cost that is so important to you as the monthly bills for current, repairs, renewals, etc. Remember, you are buying a battery charger for years of hard service. Get an HB Motor Generator Chargers are sturdy, dependable and last for years under hardest usage. If in doubt, write us for full data on various types of battery charger. Buy your Charger for Long Service and Big, Steady Profits. You run no risk with HB Chargers.

HOBART BROTHERS

Successful Manufacturers Since 1893

Box A54

TROY, OHIO



FOR ALL FORD CARS

Overcomes Every Timer Trouble

This timer is designed and built so it can't go wrong. Mechanically, it is as near perfection as an article of this kind can be made.

Its fiber rollers, in addition to their superior wearing qualities, eliminate the necessity for oil. They are a feature with which all timers should be equipped.

There are no sliding contacts to become insulated with oil; the positive contact overcomes starting troubles; the tungsten points will not pit or burn; positive timing on all cylinders; interchangeable on regular Ford fittings. Tests show remarkable savings in fuel.

SOLD ON AN ABSOLUTE MONEY BACK GUARANTEE

DEALERS

We are ready to back up every claim we make for the Duntley Magneto Break Timer. It will last the life of the car. The Duntley has shown what it will do in actual operation.

Write for our sales proposition

JACK DUNTLEY

1004 Michigan Ave.,

CHICAGO, U.S.

"LOCKS WHERE LOCKS HOLD"



Why lock the Stable Door AFTER the Horse Is Gone?

—and why regret you didn't protect your Buick after it has been stolen. The sensible, safe and sure way is to protect yourself against loss by thieves by installing

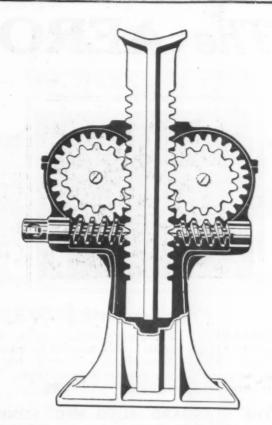
The POSITIVE Transmission Lock for BUICK Cars

Locks the gears in neutral at the only place on the Buick car where the gears can be controlled. Takes the place of the dust cap on the ball and socket lever. Locks with a single turn of the key. Safe enough to reduce your insurance rates. Every Buick car deserves this protection.

Write for complete details



BUICK CENTER CONTROL LEVER WITH POSITIVE TRANSMISSION LOCK



The jack with the worm gear drive

THE picture tells the story. It is the application of the Worm Gear to a jack. No lost motion, no friction, just the steady, irresistible lifting power of four accurate-fitting parts. With the



JACK

a child can lift two tons. The handle permits the placing of the jack in any position without stooping or crawling under the car. Once in place it cannot slip, shift or drop the load. Ride with a Rees. It makes tire changing a simple matter. Passenger car model \$9.00.

DEALERS: There is a wonderful moneymaking opportunity for the dealer who sells Rees Jacks. For information write to

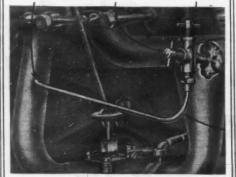
IRON CITY PRODUCTS COMPANY

Exclusive Manufacturers of Rees Jacks for Passenger Cars, Trucks, Electric and Steam Railways and other uses

7501 Thomas Blvd., Pittsburgh, Pa.

The AERODYN VALVE

AERODYN hot air Priming screw is Adjusting screw tube in position in turned to left to for regulating etor hot air intake allow motor to be mixture for different engines.



the AERO-DYN VALVE

AERODYN hot air in-take tube.

Price Complete \$4.50

DEALERS: This actually sells on sight. And it surely brings results! We absolutely guarantee "Satisfaction or MoneyBack." There's a big profit in it for you and our guarantee protects you. Write at once for full particulars.

THE STANDARD AUTO MFG. COMPANY 814 EAST GENESEE STREET SYRACUSE, N. Y. is the simplest, least expensive, and most satisfactory of all the supplementary carburetion devices on the market.

There is no question of the value of heating the mixture just before it enters the cylinders.

And the Aerodyn does this so effectively that the resultant mixture is nearly perfect and allows the engine to perform at its full power and efficiency.

Saves 25% Gasoline Adds 20% Power

This saving and this added power are not theoretical, nor the arbitrary result of tests in a laboratory only, but have been proved by day-in-and-day-out service over streets and roads, up hill and down dale, in cold and hot weather, through rain and snow and sunshine alike.

Service Stations & Garagemen

Big worth-while profits with astonishing increase of trade

immediately follows your taking on

REPLACEMENT NEW YORK IGNITION COILS

95% of all cars are coil equipped-every one a prospect. No large investment necessary. A few dollars will start you because a small quantity of different model coils fit ALL CARS.

Fifteen years' coil building experience enables us to produce a coil that gives a crashing big hot spark-even when battery is low -that insures easy starting and perfect running on present day low grade gas.

They are guaranteed for the life of the car. Don't let your competitor get the nicest piece of business ever offered but write today for trade prices and circular giving list of proper coil for each model car.

NEW YORK COIL CO.

338 Pearl Street

New York, N. Y.

FOR SALE 175

Brand New

Lavine Steering Gears

Complete with Steering Wheel, Levers, and Steering Arm; Center Control; Left Hand Drive; Suitable for 1½ or 2-ton trucks. For sale at about one-half factory price.

Address, R. N. C., 515 Marquette Building, Chicago, Ill.



Why Didn't Somebody Think of This Before?

Here's the TABER COMBINED MUFFLER AND CUT-OUT for Fords. It's a newly patented device guaranteed to end Ford muffler troubles forever.

It's a COMBINATION MUFFLER AND CUT-OUT that won't clog up, won't rattle loose and WON'T BLOW OUT.

It reduces Back Pressure. It keeps the cylinders practically free from Carbon and Oil Muck. It saves Gas, and helps the engine run sweet and clean in any kind of weather.

It gives every Ford owner a good, dependable RELIEF VALVE for his engine. It gives him more Power on the hills and in heavy mud.

If you are a Dealer or Garage Man don't lose a minute's time getting in touch with the nearest authorized jobber in your district. To handle the TABER COMBINED MUFFLER AND CUT-OUT means a profitable business among Ford owners in your locality—and lots of good will.

If you are a Ford Owner don't lose a minute's time locating the TABER representative in your neighborhood. If your local dealer or Garage Man doesn't carry TABER please write us direct for full information

EMCO MFG. CO., Inc.

47 Leroy Street

BINGHAMTON, N. Y., U. S. A.

P. S.—Not a nut, bolt or gasket to buy. The TABER comes to you complete. It is inexpensive and can be quickly and easily installed by anyone. It requires no care or upkeep.

It Is Guaranteed for the Life of the Car



Crank Shaft

Made of high chrome

nickel steel, sand blasted and double

heat treated. All

bearings ground ac-

curately to size. Fly-

wheel flange forged integral with the

crank shaft.

Lower Price?-No! Less Cost? Yes!

WISCONSIN Motors appeal to the man who can see beyond the price tag. The price is higher, on account of superior workmanship—adjustments, running in, testing, inspections. But you save in the end because the motor is finished.

Your mechanics don't waste time adjusting

Wotons

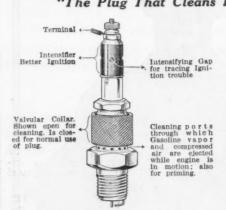
This motor was adopted as government standard for the Four Wheel Drive, Militor and 1½ ton Garford Trucks—fifteen thousand were used.

WRITE FOR SPECIFICATIONS

Wisconsin Motor Manufacturing Co. Station A, Dept. 311
DISTRIBUTORS: Milwaukee, Wis.

New York Branch: T. M. Fenner, Factory Bep., 21 Park Row. Marine Equipment & Supply Co., 610 Arch St., Philadelphia, Pa. Pacific Coast Distributor: Earl P. Cooper Co., 1310 South Los Angeles St., Los Angeles, Cal.

WONDER Self-Cleaning Spark Plug "The Plug That Cleans Itself"



The main features of the WONDER are: Rugged construction, finish, material and workmanship unsurpassed; convenience in cleaning, priming and locating of ignition trouble; gasolines aving, and prevention of carbon accumulation in cylinders.

How WONDER cleans itself: Turning the valvular collar up opens the ports and releases compression to such an extent that ignition ceases. The compression forces gasoline mixture through plug, cuts the carbon, and blows same out through ports.

DEALERS AND JOBBERS: This is the fastest selling plug on the market today. Its superiority and advantages over all competitors are so obvious to consumer when he sees it as to make it absolutely irresistible to him.

NOTE: Novel features of plug assure your salesmen an audience and business.

Very Liberal Discounts-ORDER TODAY

B. and C. ORGANIZING CO. KANSAS CITY MISSOURI



What Garagemen Think About "TRIPLEXD"

Equitable Garage, Inc. 301 W. 49th Street, New York City

Two Years Satisfaction

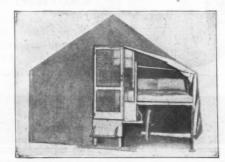
"WE have been users of your hose for about two years and during that period, while we are operating a garage that has a 300 car capacity and 1000 gal. of gas per day sale during our day and night service, we have found your hose to be satisfactory in every way."

Watch for What Garagemen Think from Week to Week

METAL HOSE & TUBING CO.



AS YOU TOUR THRU LIFE LIVE IN A



Curtis Two-Bed Tourist Collapsible Trailer

In the illustration we have thrown back the end wall to show position of bed, there being one on each side, making room for four people. In the equipment is an ice box, stove and table. Trailer has pneumatic tires and extra fly, making boot when collapsed. Entire weight 600 lbs.

With this trailer you can have a complete home on wheels. Any car can haul it. We manufacture commercial trailers also, Curtis patented ball and socket safety hitches for any trailer. Dealers and distributors wanted. Write for catalog.

CURTIS TRAILER CO. 1411 Hennepin Ave., Minneapolis, Minn.





We are in position to make immediate delivery on sets of Wire Wheels for

> **ESSEX** FRANKLIN CHEVROLET 490 CHANDLER BUICK HUDSON **OVERLAND** SCRIPPS-BOOTH **OLDSMOBILE**

List price for set of 5 wire wheels, 4 inner hubs, 4 hub caps, hub cap wrench, spoke nipple wrench, 1 hub dust cover for spare wheel, \$65. White, black, red. Color optional.

WIRE WHEEL CORPORATION OF AMERICA

(Successors to Houk Manufacturing Co.) Buffalo, New York 1700 Elmwood Avenue

Direct Factory Branches and Service Stati

New York, 83\$ 11th Avenue, at 57th Street
Phitadelphia, 328 N. Broad Street
Chicago, 23rd Street and Indiana Avenue
Exclusive Canadian Representatives: Dunlop Tire & Rubber Goods Co., Toronto

A FINE DOOR-WAY MAKES A FINE GARAGE

and the sure way to have a fine Garage Doorway to is equip it with



Scidetites Patented DOOR HARDWARE

Sold by the best hardware trade everywhere

chards-Wilcox Manufacturing | 0

AURORA, ILLINOIS, U.S.A.

Richards-Wilcox Canadian Co. Ltd. London, Ont. "A hanger for any door that slides"

Crank Shaft

Made of high chrome

nickel steel, sand blasted and double

heat treated. All

bearings ground ac-

curately to size. Fly-

wheel flange forged integral with the

crank shaft.

Lower Price?-No! Less Cost? Yes!

WISCONSIN Motors appeal to the man who can see beyond the price tag. The price is higher, on account of superior workmanship—adjustments, running in, testing, inspections. But you save in the end because the motor is finished.

Your mechanics don't waste time adjusting

Wisconsin

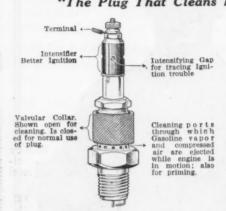
This motor was adopted as government standard for the Four Wheel Drive, Militor and 1½ ton Garford Trucks—fifteen thousand were used.

WRITE FOR SPECIFICATIONS

Wisconsin Motor Manufacturing Co. Station A, Dept. 311
DISTRIBUTORS: Milwaukee, Wis.

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TRUCK CO.
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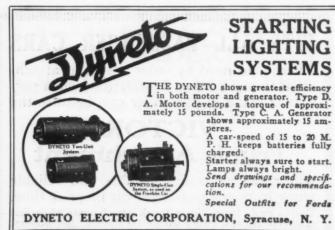






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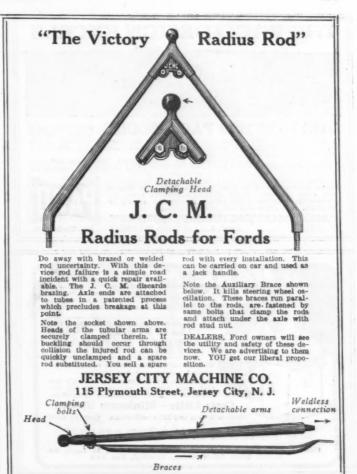
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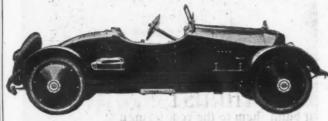
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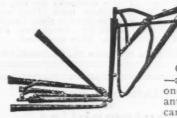
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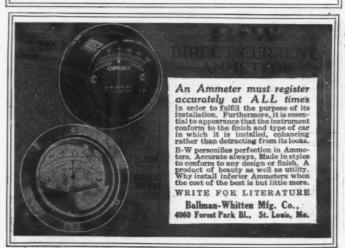
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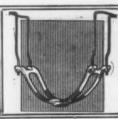
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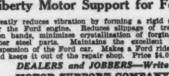




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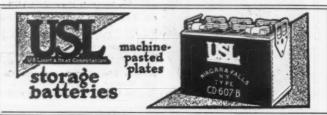
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NEW TIRES 5000 Mile Guarantee

Ribbed Non-

Size 17684	16.00 33x4½ 20.00 34x4½ 18.50 35x4½ 21.00 35x5	\$21.00 21.00 25.00 27.50 30.00 32.50	\$22.50 22.50 27.50 30.00 32.50 35.00
	Required with each O. D. subject to	h tire ordered	-
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	NEW RELINERS	34x4 36x4 35x4½ 36x4½ 36x4½	. 3,50 . 3,25 . 3,50

GOOD USED TIRES & TUBES **OBTAINED FROM WRECKED CARS**

MAIL ORDERS SHIPPED SAME DAY

Apple-A28 for Mitchell	25.00
Wagner 13 Studebaker	
	35.00
Remy No. 535	95.00
20 Delco . \	20.00
Gray & Davis 2 Unit	35.00
Westinghouse S W 1158 A	
New Remy Model 180B 6 volt	
Starter and Generator	60.00

GENERATORS

Gray Davis G. G. I. C	
Splitdorf	
Vesta 12.00	
Berdon 10.00 Delco Oakland 10.00	
Delco Oakland	
Ward Leonard for King 15.00	
Rushmore No. 1	
New Remy Generators (Round Type) with relay 18.00	
Remy with distributor 20.00	
Westinghouse with distributor	
230-221	
Northwestern 10.00	
Autolite	
New Westinghouse 209 R 20.00	
STARTERS	

The state of the s	
STARTERS	
Autolite No. 7049-2407-6145	00 00
Autolite for Abbott\$15.00-\$	15.00
Gray Davis Chalmers Leech-Neville Haynes	
Gray Davis, Lozier and others.	30.00
Autolite, Overland 79, 81, 83, 15,00-	20.00
Bijur Apperson	25.00
Allis Chalmers	
Packard Deaco	20.00
Starter for Palmer Singer	20.00
Westinghouse 533-S W 103	
192	00.00

SECOND-HAND CAR DEPT. \$150.00 to \$550.00

50 to 75 exceptionally good used cars at prices so low that they would even interest dealers.

SPEEDOMETER HEADS wart or Warner\$1.50 to \$4.00

Spotlights 3.50
Extra Good Stewart Vacuum
Tanks 6.00
Carter Tanks 2.50

DEPOSIT REQUIRED WITH ALL ORDERS

PHONE CALUMET 7315 CHICAGO, U. S. A. 1915 SOUTH STATE STREET E HAVE NO BRANCH STORES

Parts and Repairs.

Parts and Repairs.

Parts and Repairs.

AUCTION

On Tuesday, May 27th, 1919, at 11 o'clock A. M. at Ecorse, Michigan (suburb of Detroit), we will sell at public auction, all the assets formerly belonging to the Robinson Machine Company, Bankrupt.

INVENTORY VALUE OVER \$200,000

This is one of the finest plants containing machinery we have sold in years, being fully equipped for the manufacture of anything in the metal or motor truck construction line. Consisting of an immense lot of Merchandise such as Wheels, Axles, Springs, Brackets, Bearings and complete Truckford Attachments, Frames, Chains, etc.

\$30,000 worth of the finest Shop Tools obtainable.

AN ENORMOUS LOT OF

Accessories such as Hubs, Flanges, Cams, Shackles, Straps and hundreds of items too numerous to mention.

3 GENERAL ELECTRIC CO. MOTORS, 5, 25 AND 30 HORSE POWER 10 TON SHAFTING, PULLEYS AND HANGERS 5,000 FT. FINE BELTING

MACHINERY

Consisting of Greeley, Libby, Davis and Dresses Turret Lathes. Monarch, Hamilton, Reed, Oliver and Rockford Engine Lathes. Warner and Fitchburg Engine Lathes, Steptoe Shapers, Rockford Planer, Kempsmith and Ohio Milling Machines, U. S. and Gray Thread Milling

Machines, Champion Barnes and Rockford Back Geared Presses, Gardner and Besly Grinders, Landis Grinder, Shapers, Key Seaters, Henry and Wright, Barnes and Baker Bros. Drill Presses, Arbor Presses, Hack Saws and others.

5 TRUCKS, ROADSTERS AND TOURING CARS' A FINELY EQUIPPED OFFICE IN OAK AND MAHOGANY

Descriptive circulars are being issued and can be had at office of undersigned auctioneers.

HOW TO GET THERE: Take Wyandotte and Trenton car (in Detroit) and get off at Mills Street.

ALL OF THE ABOVE WILL BE SOLD IN LOTS TO THE HIGHEST BIDDER FOR CASH. A DEPOSIT OF 25% WILL BE REQUIRED FROM EACH PURCHASER. TO AVOID COMPLICATIONS, KINDLY HAVE ALL CHEQUES CERTIFIED

SAMUEL L. WINTERNITZ & CO., Auctioneers, 1049 1st Nat'l Bank Bldg., Chicago, Ill.

AUCTION!—

----AUCTION!

We Will on Wednesday

May 28,1919, at 10:30 A.M., at 49 Adelaide St.

DETROIT, MICHIGAN

Sell at Public Auction all assets formerly belonging to the Detroit Bolt and Hardware Company

INVENTORY VALUE Over \$85,000, Consisting of

1,500,000 Machine Bolts 1,400,000 Carriage Bolts 165,000 Tire Bolts 125,000 Step Bolts 12,000 Plow Bolts 350,000 North Bolts 1,400,000 Stove Bolts 300,000 Cap Screws 300,000 Set Screws 750,000 Semi Finished Hexagon Nuts 15,000 Cold and Hot Punched Nuts 200,000 Slotted and Castellated Nuts 1,000,000 Lock Washers 25,000 Gross Wood Screws 15,000 Gross Machine Screws 75,000 Rivets 1,000,000 Cotter Pins

The above merchandise is in original packages, all standard A. L. A. M. & U. S. Standard sizes from such famous manufacturers as the Oliver Iron & Steel Company, Lake Erie Iron Company, Upson Nut Company, Columbus Bolt Works, Garland Nut & Rivet Company, Reed & Prince Mfg. Company and other standard manufacturers. Also a completely furnished office with desks, chairs, typewriters, cabinets, multigraph, electric addressograph, stencil cutters, tables, benches, racks, etc.

Please Bear In Mind That This Sale Takes Place In DETROIT, Mich.

ALL OF THE ABOVE WILL BE SOLD IN LOTS TO THE HIGHEST BIDDER FOR CASH. A DEPOSIT OF 25 PER CENT WILL BE REQUIRED FROM EACH PURCHASER. TO AVOID CONFUSION, WE SUGGEST THAT PROSPECTIVE PURCHASERS HAVE CHEQUES CERTIFIED.

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Parts and Repairs.

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Broken or Worn Out Parts

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Bargain Lists!

TIME AND MONEY

Every Part Guaranteed or Money Promptly Refunded

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Everett 30\$30.00	
Flanders 20 50.00	
E M F 30 40.00	
Columbia 60.00	
Studebaker 4-15	
Studebaker 6-13 75.00	
Overland 53 50.00	
Overland 60 50.00	
Overland 71 75.00	
Mitchell 6-17	
Chalmers 6, 1915	
Steddard Douter 20	
Stoddard Dayton 30 60.00	
Stoddard Dayton 45 75.00	
Stoddard Dayton Savoy	
Interstate 1916 75.00	
Kissell 40 75.00	
Empire 25 75.00	
Buick 17 75.00	
Case 1914 75.00	
Cadillac 1912 75.00	
Packard 6-48 1912	
Packard 6-48 1914300.00	

UNIT PLANTS

Ja	ckson 4	0											\$75.00
CI	nalmers	17											75.00
M	enomine	e Tru	ICK.										75.00
Na	sh Tru	ck Mo	del:	2017									175.00
De	odge 191	6 Sta	rter	Ger	iera	Lto	r.						175.00
Pa	tige 191	6, Fai	rfield	d St	art	er	G	en	er	at	OI		175.00
H	udson 6	-54 St	arte	r G	ene	era	to	P.					175.00
Ny	berg 6												100.00
Oa	klend 6	1-60											150.00
37.0	lie 6 1	0.17						. 4					100.00
V.	elie 6, 1	911											200.00
Pa	thfinde	r 12-0	yl.	Star	ter	G	en	er	at	OI	٠.		400.00
Oa	k!and !	8-cyl.	Star	rter	Ge	ne	ra	to	r.				300.00
Ki	ssel 6 S	tarter	Ger	nera	tor							-	250.00
													-00.00

Auto Wrecking Company THE ORIGINAL "WE TEAR 'EM UP AND SELL THE PIECES"

13th and Oak Streets

KANSAS CITY, MO.

PARTS FOR ALL CARS We Save You 50 to 80% of the Original Cost S

SATISFACTION OR YOUR MONEY BACK

5% Off for Cash in Full with Order.

Deposit Required with

All Orders. Get Our Prices on New PREST-O-LITE TANKS

Model B, \$4 each; E......\$3 each Searchlite Tanks......\$2 each 36x4½ Wire Wheels Set of Four...\$50.00

33x4 Houck Wire Wheels for Overland Set of Five....\$50.00

OUR SLIGHTLY USED
Tires and Tubes

OBTAINED from WRECKED CARS
Mean Economy to You—A Trial

 Will Convince You

 Size
 Tires
 Tube

 30x3
 \$ 4.50
 \$1.3

 30x3½
 5.50
 \$1.4

 31x3½
 5.75
 1.5

 32x3½
 6.00
 1.5

 34x3½
 6.50
 1.6

 31x4
 7.00
 1.6

 32x4
 7.75
 1.6

 33x4
 8.50
 1.7

 34x4
 8.50
 1.7

 36x4
 10.00
 1.7

 37x4
 12.50
 1.7

 34x4½
 9.00
 1.7

 35x5
 10.25
 2.0

 30x5

Special New Tires

Double Tread Tires

Selected from best used material obtainable. Keliners, \$1.25 Extra

Two tires, one with good top and other with good sidewalls are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

You You

NEW GEARS FOR ALL CARS

MOTORS In Excellent Condition

Full Cash Refunds, less Express Charges, Allowed on Returned Goods. Prompt Attention to Your Orders.

MOTOR SALVAGE CO.

1425 S. State St. CHICAGO, ILL.

VOLFAUTOPARTS&TIRE

619 NORTH ILLINOIS STREET "A Million Parts"

INDIANAPOLIS, INDIANA

BELL PHONE 1579 MAIN Save 35% to 80% AUTO. PHONE 22-063

Here's a partial list of cars for which we have parts. If the name of your car is not listed send us the part and we will duplicate, as we are daily buying and wrecking cars. We absolutely guarantee to return parts at our expense that can not be duplicated.

Case Chalmers Chevrolet Clark Clark
Cole
Columbia
Continental
Cutting
Davis
De Tamble
E. M. F.
Elmore Empire
Everitt
Flanders
Ford, Model S
Great Western
Haynes
Henry
Herreshoff
Hudson Hupp I. H. C. Inter-State

International Kelly Kissel-Kar Knox Krit Leader Lexington Little Locomobile Lozier Lyons Knight Marion, 4 and 6 Marmon Matheson Maxwell Marathon McFarlan Mitchell Mitchell Nyberg, 4 and 6 National Oakland Oldsmobile Overland

Packard Paige Paige-Detroit Parry Parry Parry-Knight Pathfinder, 4 & 6 Peerless Pierce-Arrow Pilot Pope-Hartford Premier, 4 and 6 R-C-H

Randolph Regal Underslung Regal Underslung Reo Richmond Richmond Sampson Service Silent Knight Speedwell Standard Electric

Stearns
Stoddard-Dayton
Studebaker
Stutz
Thomas-Detroit
Thomas Six
Waverly Electric
Wayne
Westcott
Zipp Zipp Winton Six

USED PARTS FOR MOST MAKES OF CARS GUARANTEED TO BE IN PERFECT WORKING ORDER

Large stock of 2, 4, 6 and 8 cylinder motors; also Bosch, Eisemann, Simms and other high tension magnetos. Axles, radiators, springs, etc.

Used Parts for Trucks

Get Our Prices First and Save Time

Million Parts and Growing Every Day

THE SEASON OPENS IT IS TIME HIGH PRICES ARE CHASED TO THE TALL TIMBERS

TILL DELLOCT	, OI BITTO OM
Glance over the following list-N	ote our prices—Remember we h
We know	how to buy so that we can se 1.00 Bethlehem \(\frac{1}{2} \) Extension \(\ldots \) 45c
FOR YOUR FORD	1.25 Jumbo ½" Extension45c
Bumpers, Channel type\$5.00	1.00 A. C. 7/8 inch long Dodge 45c
New Era Accelerators	2.50 Mosler Spitfire % A.L.A.M45c
	ACCESSORY SNAPS
	Rubber Pedal Pads for Overland,
	Chevrolet, Studebaker, Hud-
Fan Belts for Fords	son, Maxwell and Cadillac.
serve Gauge	per set\$0.25
Pistons, standard and oversize,	J. T. Windshield Cleaners60
complete with piston rings,	Windshield Runner Weather
piston pins and bushings 1.50	Strips
Coil Points K. W. Points for	Electric Head Lamps, per pair. 5.00 Electric Tail Lamps
Ford coil units	Electric Tail Lamps
Lined Brake Shoes, per pair95	size, per pair 1.75
All Steel Cutouts	Trojan Electric Motor Horns,
Master Vibrators, Connecticut 1.98	6 volt, \$6.00 value 2.95
Rubber Pedal Pads, set	25.00 Klaxon 12 volt horn15.00
Alarm for Fords, a horn button	Tire Covers, all sizes except 30x31/2 .75
that attaches to the end of	Bumpers, channel type 5.25
gasoline lever	Carbon Scraper, set
Waldren Transmission Band	\$2.00 Marvel Tube Vulcanizer 1.60
Wrench	Adamson M/T Gasoline Vulcan-
Bonnie Wrench Sets, set of end	izer
wrench fitting all Ford nuts 1.20	Brake Lining, many sizes, 40%
18 inch Steering Wheel 3.95	off list.
Crown Fenders, per set18.00	Piston Rings, reg. plain type,
Speedster Fenders, the long	any size
sloping kind, complete set of	Battery Boxes for any standard
four fenders	6 V. battery
hold pump 1.35	6 volt. model G. G. Autolite
Electric Tail Lamp	Generators
Champion X Spark Plug, gen-	6 volt Ward Leonard Generator 15.00
uine, only four to a customer45	6 volt Ward Leonard Starters15.00
Muffler Cutouts	Reo
Stewart Speedometers, not the	1 lb. can valve Grinding Com-
instrument broad type 6.50	pound
Timers 1.05	Boko Collapsible Buckets35
Spindle Arm Bolts	Steel Running Board Mats50
Warner and Shaler Lens, pair. 1.75	Pioneer Grease Guns
Windshield Ventilators, makes the old type windshield a ven-	Hydrometers for testing storage
tilator shield 1.05	hatteries
	Rubber Aprons—save your clothes .50
SPARK PLUG SPECIAL	Friction Tape, per pkg
1.00 ½ inch Sando Spark Plugs,	ELECTRIC LIGHT YOUR FORD
each	Complete lighting system. Includes
only 4 to a customer 450	generator, complete storage battery,
only 4 to a customer45c 1.00 Red Head Spark Plugs — all	electric side and tail lamps, switches,
giana Aka	Electric side and tall lamps, switches,

sizes ... 45c
A. C. ½ inch special plugs ... 19c
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wiring, etc. Everything complete installation. Regular price \$29. Our price, \$17.50.

All makes and sizes in stock. Bear-ngs suitable for all cars. Immediate

have been in business 18 years ell right. PAINTS AND POLISHES | PAINTS AND POLISHES | \$0.40 \(\frac{1}{2} \) pit Cans Whiz Rapid Repair Enamel | \$0.25 \) 3.75 | gal. Peerless Trie Paint | 1.45 \) 5.00 | 10 z, bottle Wax-O Polish | .25 \) 1.00 | qt. bottle Wax-O Polish | .25 | 1.00 | qt. bottle Wax-O Polish | .75 | 1.25 | qt. Peerless Lamp Enam | .75 | .75 | 1.00 | 1 can French Lustre | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .50 | .5

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All makes for all cars—Let us quote RADIATORS FOR ALL CARS Brand new Honeycomb Type for all cars. Write for price list.

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FOR TRANSMISSIONS AND DIFFERENTIALS SHAFTS AND PINS FOR ALL MAKES CARS LARGE MANUFACTURERS FOR THE TRADE.

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'In the Heart of the Wrecking District''

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500 Makes and Models

'Most Any Part—'Most Any Car 50% to 80% Off Original Cost

NOTICE:

We can make good on the above claims. Note that we do not say "any part" for "any car,"—but "ALMOST ANY" is right. We have one of the largest stocks of parts in the middle west, which enables us to give you real service.

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Try us on your next order. You will be pleased with our service and our goods. Your money refunded gladly

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MAKES OF CARS FOR OVER 100 DIFFERENT

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Send your old parts in for duplication and we will guarantee to satisfy you as to price.

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FULLINGTON AUTO PARTS

Ready for Immediate Shipment **MAGNETOS**

MOTORS

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Anything You Want for Your Car YOU MUST BE SATISFIED

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Now is your opportunity to buy supplies right. All goods guaranteed in first class condition.

Demountable wheels, 30x31/2set	\$13.00
Steering gearseach	5.00
Pressed steel frameseach	5.00
Inner tubes, all sizeseach	2.50
Ford one-man tops with jiffy curtains	
each	25.00
Overland seat coversset	8.00
Tail-lights with bracketseach	.60
	15.00
Ford radiatorseach	
30x3 1/2 tireseach	9.00
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(These are water-soaked and dirty,	
but not damaged)	
Ford side oil lightspair	1.50
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4-cyl. motors, neweach	55.00
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Spark Plugs, lots of 25each	.15

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Underslung Parts FREE with each body, or \$12.50 PER SET

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Cameron—Crawford
Detroiter—Enger 40
E. M. F. 30—Fal Car
Flanders 2 & 3 speed
Firestone Columbia
Euller
Flanders 2 & 3 speed
Firestone Columbia
Fuller
Halladay—Haynes 1910
Herreshoff—Hupp 20
H. C. H., 2 & 4 cylinder
Olympic-Majestic 45-50E
Kissel Kar 40
King—Knox 40
Lambert 2 & 4 cylinder
Olympic-Majestic 45-50E
Kissel Kar 40
King—Knox 40
Lambert 2 & 4 cylinder
Olympic-Majestic 45-50E
Kissel Kar 40
King—Knox 40
Lambert 2 & 4 cylinder
Olympic-Majestic 45-50E
Kissel Kar 40
Veryel 30-40
Winton Six
WeFarland Six
McFarland Six
McFarland Six
McFarland Six
Marathon 30-40
Moon 40
Marathon 30-40
Maratho Firestone Columbia
Fuller
Fuller
Ford—N. R. & S.
Great Northern
Halladay—Haynes 1910
Herreshoff—Hupp 20
Hudson 20
L. C. H., 2 & 4 cylinder
Jackson 2 & 4 cylinder
Olympic-Majestia 45-50E
Kissel Kar 40
King—Knox 40
King—Knox 40
Lambert 2 & 4 cylinder
Lexington 40
Complete Motors, Transmissions and Rear Axles, Money
refunded on all parts within 10 days if unsatisfactory.

Ruy Your Parts in WICHITA, KANSAS

-POPE HARTFORD PARTS-

Buy your parts for all models of Pope Hartford cars from the only legitimate and authorized manufacturers - who own the original drawings, patterns, tools and fixtures and are making these parts daily. Don't buy and use second hand parts. They may be the cause of serious accidents and result in much additional expense in the long run.

THE HARTFORD MOTOR CAR CO. 410 Main St. Hartford, Conn. Parts and Repairs.

Parts and Repairs.

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For 150 different makes of automobiles (750 models)

And furnish them when you want them.

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SERVICE—Every inquiry will receive prompt attention. Orders shipped same day received. Satisfaction guaranteed or money refunded.

Auto Parts Company

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ANYTHING A For the Automobile C NEW AND USED C Gears, Axles, Bearings, Generators E **PARTS** S 50% and LESS S 0 "We have it, will get it, or it isn't made."

PHONE-WRITE-WIRE Newton Auto Salvage Company

E S 205-11 Tenth Street DES MOINES, IA.

USED

FOR MOST MAKES PARTS OF CARS, 25 to 75 per cent off manufacturers' price list.

Complete motors or parts for same. Gears, magnetos, axles, radiators, carburetors, transmissions, any part; lowest prices; write today.

Eureka Auto Parts & Tire Co.

111 West Michigan Street and 448 North Illinois Street Indianapolis, Indiana Circle 878

NEARLY 3.000.000 PARTS

AUTO TOPS

TOP RECOVERINGS
BACK AND SIDE CURTAINS
SEAT COVERS

SEAT COVERS
For All Cars
SPECIALS FOR FORDS
Complete Rof and Back, Ready to Put On
oadster \$8.75
ouring Tops, complete 36.00 Touring Tops, complete.

SEAT COVERS

Roadster \$9.15 Touring \$11.00

GENERAL OR SPECIAL FORD CATALOG
Sent Free Upon Request
SPECIAL DISCOUNTS TO DEALERS

ATLANTA AUTO TOP AND

TRIMMING COMPANY
153 Edgewood Ave., ATLANTA, GEORGIA

Lozier Owners

Why Buy Counterfeit Repair Parts? We Have All

Original Parts

Made from Original Patterns Order from Headquarters

LOZIER MOTOR CO. FORT AND 6th STREETS, DETROIT, MICH.

SERVICE STATIONS: E. A. Cornley, Inc., 1445 Bush St., San Francisco, Cal. Lozier Motor Co., 47th St. & 11th Ave., New York City

50 TO 80% OFF ON ORIGINAL PRICE ON

PARTS FOR ALL CARS

PARTS FOR ALL CAKS
1200 Magnetos., \$ 5 to \$30
200 Radiators. 10 to 30
Rear Axles. 15 to 40
Front Axles. 5 to 10
Crank Shafts. 10 to 40
700 Roller Bearings 1 to 3.25
PRESTO TANKS
"B" \$3.75
"E" \$2.90
Searchlight. \$1.75
25 MOTORS: Waukesha, \$60; Apperson 4, \$90 Studenbaker 6, 1914, Starter, Generator Magneto, \$100; Rutenber, 4 cyl., \$80; Regal N, Starter, Gen., \$70; Rutenber, 4 cyl., \$80; Regal N, Starter, Gen., \$70; Bosch Dul4, Mags., Var. Spark, \$24; Electric and Gas Lights. \$6.

Bosen Dus, Mago., All School Delay Bosen Deposit With Order—Satisfaction OR MONEY BACK.

IOWA AUTO PARTS CO. 823-29 W. 2nd St. Davenport, Iowa

WRITE PARTS Following Cars

FOR Abbott Detroit—
E 44

Brush—— 2-Cyl.
Hudson—20. 33

30 31, 35, 40
Cadillac—10
Chalmers—30, 36
Model 17
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Models
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Memphis Auto Parts Co.

1070 Union Avenue, MEMPHIS, TENN.
"The Largest Parts House in the South" Service - System - Satisfaction

Save 35 to 75%

We wreck hundreds of cars and are continually buying more. From our large assorted stock you will find the part you want.

Write for parts for the following cars. Give model, number and part you want. International International International International International Children Marmon Maxwell Michigan Mitchell National Oakland Oldsmobile Overland Paige Peerless Pierce Arrow same day order same day order Premier Rambler R. C. H. Regal Reo Seldon Abbott-Detroit American Apperson Buick Cadillac Case Chalmers Seldon
Speedwell
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Empire Haynes Hudson Hupmobile Shipments made same day order is received. Remit-cance required on all orders to cover express charges. We guarantee our parts to be satisfactory or we will return your money.

Brand New Parts

Including Transmission Gears, Differential Gears, Axles, Universal Joints, Clutch Linings and Parts, Cylinder Head Gas-kets, etc. Lowest prices con-sistent with quality and

GUARANTEE

with every part shipped. Complete satisfaction or your money refunded in full.

DAYTON AUTO PARTS CO. 1623 McGee Street

Kansas City, Mo.

AUTO Save 50-90% PARTS

1910-1919 Buick, Cadillac, Dodge, Studebaker, Pope, Packards, Pierce, Etc.

 Motors
 \$25.00 up
 Presto Tanks
 \$4.50 up

 Magnetos
 4.00 "
 New Spotlights
 2.00 "

 Carburetors
 3.00 "
 Generators
 10.00 "

 Rear Axles
 15.00 "
 Gears
 1.00 "

 Front Axles
 5.00 "
 Bearings
 1.00 "

 Cylinders
 5.00 "
 Radiators
 10.00 "

Jobbers in Bankrupt Auto Supplies

BRIGHTMAN AUTO EXCHANGE 321 Windsor Ave. Hartford, Conn.

Largest Exchange in New England

-ATTENTION! MARION OWNERS-

All Parts for All Models

Save money—Buy your Transmission, Differential, Rear Axle and Motor Parts from us.

Liberal Discount Allowed on All Parts

MARION MOTOR CAR CO. of CHICAGO 2450 Michigan Ave., Chicago, Ill.

UNDERSLING YOUR FORD

CRAIG-HUNT Parts are the safest and BEST COMPLETE SET, for lowering the Ford Frame \$25.00

We make 16 valve Racing Heads, Racing Bodies, Pistons and counterbalances for the Ford CRAIG-HUNT, Inc. 910 North Illinois Street, Indianapolis, Ind.

Krit Owners We furnish quick service on all engines, clutch, transmission, differential, front and rear axle, steering gear, wheels, steering knuckles and cones, fenders, frames and body parts—from original Krit stock. For all models from 1900-15, inc.

MOTOR CORPORATION 1309 Race Street Philadelphia, Pa.

RIMS MAKES WHEELS

Pneumatic Tire Wheels for Ford Trucks. Five Detachable Wire Wheels for Fords. Complete Catalogue on Request

CHICAGO WHEEL & RIM CO.
O Wabash Avenue CHICAGO, ILL. 2010 Wabash Avenue

RIMS - RIMS - RIMS

 New Firestone Q. D. 34x4½, \$5.00; 36x4½
 \$5.50

 34x4 Firestone S. S. Slightly Used.
 3.00

 32x4 Firestone Q. D. Slightly Used.
 4.00

 30x3½ Stanweld Q. D. Slightly Used.
 2.00

 36x4½ Stanweld S. S. Slightly Used.
 3.00

 All Rims and Rim Parts in Stock

KASTNER RIM COMPANY Chicago, Illinois 2125 Michigan Avenue

When Writing to Advertisers, Please Mention Motor Age

HERE'S ANOTHER LETTER OF PRAISE From a Customer Who Comes Back for More

Birmingham, Ala., April 24, 1919.

Lincoln Tire & Supply Co., 1463 S. Michigan Ave., Debt. L.

Gentlemen:

The tire ordered came and am very pleased with it. Please ship at once three more 36"x4" clincher casings, C. O. D.

Yours very truly,

R. B. BAZEMORE, 117 S. 21st Street, Birmingham, Ala. A COMPLETE STOCK OF SLIGHTLY USED AND FACTORY REPAIRED

T TIRES I TIRES R TIRES E TIRES S

A SATISFIED CUSTOMER IS OUR BIGGEST ASSET, THEREFORE WE MUST SATISFY YOU

Size Used Tire 30x3\$4.50	New Tube \$1.95	Size Used Tire 32x4\$7.75	New Tube \$3.05	Size Used Tire 35x4½\$ 9.25	New Tube \$4.25
30x3½ 5.50	2.30	33x4 8.50	3.25	36x4½ 9.50	
31x3½ 5.75	2.40	34x4 8.50	3.40	37x4½ 10.00	4.50
$32x3\frac{1}{2}$	2.40	35x4 8.75	3.50	35x5 10.25	4.60
$34x3\frac{1}{2}$	2.60	36x4 8.75	3.65	36x5 10.25	4.70
31x4 7.00	3.00	$34x4\frac{1}{2}$	4.15	37x5 10.75	4.75

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly, with privilege of examination, and balance C. O. D. Specify style of rim to avoid delay.

Our Used Tires are not guaranteed for any definite number of miles, but we will make reasonable adjustments on all tires that do not give service in proportion to the price paid, providing tires are returned to us by prepaid express. Is not this fair enough?

WE CARRY A COMPLETE STOCK OF NEW TIRES WRITE FOR PRICES, STATING SIZE DESIRED

LINCOLN TIRE & SUPPLY COMPANY

1463 South Michigan Avenue, Dept. L,

CHICAGO, ILLINOIS

Thousands of Dealers

are regularly receiving lists of our MONEY EARNING BARGAINS.

Write and have your name placed on our mailing list. Large stock of all standard makes

SECONDS

always on hand

Broadway Tire Jobbers, Inc.

250 West 54th Street

New York, N. Y.

TIRE SALE SERLIN'S

BUSINESS IS SENSITIVE
IT GOES WHERE IT IS INVITED AND
STAYS WHERE IT IS WELL TREATED
WE INVITE YOURS

New and Used Tires—STANDARD MAKES

	FRESH	STOCK	
-1-5	New	Used	New
Size	tires	tires	tubes
28x3	\$ 8.60		\$1.95
30x3	8.35	\$5.00	m 1.90
30x31/2	10.80	6.00	2.30
32x3½	12.70	7.50	2.40
34x3½	14.80	8.00	2.80
31x4	16.65	8.50	2.95
32x4	16.95	8.50	3.00
33x4	17.70	9.00	3.10
34x4	18.10	10.00	3.20
35x4	20.60	10.00	3.60
36x4	21.25	10.50	3.70
33x4½	23.60	10.50	3.85
34x41/2	24.40	11.00	4.00
35x4½	25.50	11.00	4.15
36x41/2	25.90	11.50	4.70
37x41/2	29.65	13.00	5.35
35x5	29.10	13.50	5.00
36x5	29.90	12.50	4.85
37x5	30.75	13.50	5.00

STATE SIZES DESIRED
Add 10% for Non-Skid
Special Prices to Dealers in Large Lots
MAIL ORDERS SOLICITED
10% deposit required with each tire ordered, balance
C. O. D. subject to your examination and approval.

Serlin Tire Co., Inc.

1300-1302 Michigan Ave., Chicago, Ill. PHONE CALUMET 3407-3408

Hupp 32 & EMF Parts

160 DIFFERENT MAKES CARS in PARTS SEND US YOUR OLD PIECES PROMPT ATTENTION

UNITED AUTO WRECKERS
Main Yard, 541-549 Wyoming St., Dayton, O.
PHONE E-3067

GOOD DOUBLE TREAD TIRES \$0x3.4 \$ 6.25 \$ 32x4 \$ 9.00 \$ 32x3 \$ 7.25 \$ 33x4 \$ 9.50 \$ 32x3 \$ 9.75 \$ 31x4 \$ 8.60 \$ 11.75 \$ 31x4 \$ 8.60 \$ 11.75 \$ 31x4 \$

REBUILT TIRE COMPANY
123 N. Rose St. Kalamazoo, Mich.

WANTED

Reliable Firms to Advertise in This Section. Let us tell you how thoroughly, yet economically, you can reach the motor car field.

Classified Advertising Departments
MOTOR AGE, Mallers Bldg., Chicago

SPECIAL ANNOUNCEMENT!

AUTO NEEDS COMPANY

is now under New Ownership and Management; and in position to Offer You Better Tire Bargains.

Service and Satisfaction—the Kind that Makes Steady Customers

TIRES & TUBES

SLIGHTLY USED TIRES OBTAINED FROM WRECKED CARS AND FACTORY REPAIRED

Size	Tires	Tubes	- Size T	ires Tubes
30x3	\$ 4.50	\$1.35	36x4\$1	0.00 \$1.75
30x3 1/2	5.50	1.45	37x4 1	2.50 1.75
31x31/2	5.75	1.50	34x4½	9.00 1.75
32x31/2	6.00	1.50	35x4 1/2	9.25 1.80
34x31/2	6.50	1.60	36x4 1/2	9.50 1.85
31x4	7.00	1.65	37x41/2 1	1.00 1.90
32x4	7.75	1.60	35x5 1	0.25 - 2.00
33x4	8.50	1.70	36x5 1	
34x4	. 8.50	1.70	37x5 1	0.75 2.20
35x4	9.00	1.75	40x4 Non-S	Skid15.00

NEW TIRES NEW, FRESH STOCK

	EX	ceptional	Bargan	IS	
Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$ 8.60	\$1.85	35x4	.\$20.60	\$3.50
30x3	8.35	1.80	36x4	. 21.25	3.60
30x31/2	10.80	2.20	33x4 1/2 .	. 23.60	3.75
32x31/2	12.70	2.30	34x4 1/2 .	. 24.40	3.90
34x3½		2.70	35x4 1/2 .		
31x4	16.65	2.85	36x4 1/2 .	. 25.90	4.60
32x4	16.95	2.90	37x4 1/2 .	. 29.65	5.25
33x4	17.70	3.00	35x5	. 29.10	4.90
34x4	18.10	3.10	36x5	. 29.90	4.75
			37x5	. 30.75	4.90
	ADD	10% FOI	R NON-S	SKID	
		CIAL NI			
32x4 Clin	ncher.	.\$10.00 3	5x4½ Cli	ncher.	\$15.00

\$1.00 Deposit Required With Each Tire Ordered, Balance C. O. D., Subject to Examination. Specify Style of Rim.

AUTO NEEDS COMPANY

Guaranteed Quality Seconds

Size	Tire	Tube	Size	Tire	Tube	Size	Tire	Tube
28x3	\$ 8.40	\$1.90	32x4	\$16.60	\$2.95	35x41/2	\$25.05	\$3.95
30x3	8.20	1.95	33x4	17.35	3.00		25.45	
30x31/2	10.60	2.25	34x4	17.80	3.15	37x41/2	29.10	4.05
	12.45	2.40		20.25	3.50		28.55	4.70
34x31/2	14.50			20.85	3.65	36x5	29.80	5.25
31x4	16.30	2.85	33x41/2	23.75	3.75	37x5	30.75	4.95
			34 v 4 1/2	24.00	3.80			

Add 10% for Non-Skid. 10% deposit required with all orders, balance C. O. D., subject to examination. Specify type and size desired. Get Our Wholesale Accessory Bulletin. It's Just Off the Press

STERLING TIRE & SUPPLY HOUSE CHICAGO, ILLINOIS

If an Old Tire

is sent us express prepaid for each tire ordered, we will allow you

The following prices on FACTORY REBUILT TIRES of High Grade Standard Makes Only. Rebuilt with two layers of new fabric on the inside, one layer on the outside; new breaker strip; new cushion gum; and a new tough non-skid tread. Prices on Non-Skid

	Non- Skid \$ 9.65	New Tubes \$2.00	Non- Size Skid 34x4\$19.70 36x422.90	New Tubes \$3.65 3.85
32x31/4.	12.50	2.30 2.45	34x41/2 23.45	4.15 4.20
32x4	18.15	3.20 3.40	36x41/2 24.55	4.30
33x4	19.10	3.50	35x5 26.20	4.03

No deposit required when old tires accompany order. We carry a complete stock of high grade, standard make CORD and FABRIC Tires. Get our prices.

The Armstrong Tire & Vulcanizing Company

1342-44 Michigan Ave., Chicago PHONE CALUMET 5212 AND 2199

No Deposit Required

Demonstrating

All Non-Skid TIRES All Non-Skid

They Are MUCH BETTER Than the Ordinary Used Tires

812	ze.	Tire	Tube	Size	Tire	Tube
302	3	\$ 6.50	\$1.75	32x41/2	.\$13.00	\$2.35
30:	31/2 :	7.50	1.90	33x41/2	. 13.50	2.50
32:	31/2	9.00	2.00	34x4½		2.60
	x4		2.15	35x4½	14.00	2.65
33:	¢4	11.50	2.25	35x5		2.85
34:	κ4	12.50	2.35	37x5		2.95

NEW TIRES

ALL NON-SKID

29x2%\$ 8.75 30x3 9.50	31x4\$19.00 32x4 19.40	35x4½\$27.70 36x4½ 28.15
$30x3\frac{1}{2}\dots 12.40$ $32x3\frac{1}{2}\dots 14.55$	33x420.25 $34x420.75$	35x5 31.65 37x5 33.50

New Mold Blemished and Slightly Used Cord Tires. Write for Your Sizes.

5% Off for Cash in Full with Order. Otherwise, goods shipped C. O. D., subject to examination. Specify whether clincher or straight side.

Royal Tire & Supply Co. 1461 Michigan Avenue CHICAGO, ILL.

MR. DEALER

U—NEED—A Competitive Tire

"Wiloxatlantic"

NON-SKID	NON-SKID
30x3\$ 7.65	31x4\$15.09
30x3½ 9.83	32x4 15.35
32x3½ 11.53	33x4 16.01
34×4	\$16.42

These Tires are "Firsts," wrapped in paper, bearing serial number and manufacturer's name.

Order just one small size for a sample, after you see sample, you will order a hundred or more.

Atlantic Tire & Rubber Co. 1305 Maryland Ave. Baltimore, Md.

New Reduced Tire Prices

]	Plair	n.	Non-Ski	id	
30x3									\$	7.50)	\$ 9.0	0	
30x31/												11.5	0	
32x31/2									1	2.50)	13.7	5	
31x4												17.0	0	
										7.00		18.0	0	
34x4									1	8.00	0	19.0	0	

Dept. A. 10% Deposit required with each order, Balance C. O. D.

VICTORIA TIRE & RUBBER CO. 1329 Michigan Ave. Chicago, Ill.

Standard Used Tires

est Values Ever Offered for the Money SAVE YOURSELF 75%

By	Buving	Your S	ummer	Needs N	Jose
203	Used	New		Used	New
Size	Tire	Tubes	Size	Tire	Tubes
	\$ 4.50	\$1.75	34x4	\$ 9.00	\$2,35
30x31/2		1.90	34x41/2	9.25	2.60
32x31/2	7.00	2.00	35x41/2	10.00	2.65
32x4	7.50	2.15	36x41/2	10.00	2.75
33x4	9.00	2.25	35x5	10.50	2.85
33x41/2.	10.00	2.50	37x5	11.50	2.95
C. 0. I	posit requ	ired with	each tir	e ordered, Specify	balance

or straight side.

5% Off for Cash in Full With Order GOODWAY TIRE CO. 1463 MICHIGAN AVE.

REDUCED PRICES

Guaranteed Tires

30x31/2 Non-Skid

\$10.50

Real Bargains—TIRES & TUBES, Firsts and Seconds. **Dealers**—Write us for prices on sizes you require.

ACORN TIRE & RUBBER COMPANY 1350-54 Michigan Avenue, Chicago, Illinois

Guaranteed for good service. Big—Strong—Extra Heavy 30x3 Tire \$5.50; 30x3½ \$7.00; 33x4 \$10.05; 34x4 \$10.25; 36x4½ \$13.00; 37x5 \$14.00. Big saving on other sizes and Tubes also. Trade in your old Tires. 10% deposit required on C.O.D. orders. Send for list now! State size and bead of tire. Orders filled same day received.

M. LIBEN & COMPANY 205-M West 48th Street New York City

Tires. Rebuilding and Repairing.

Rebuilding and Repairing.

Rebuilding and Repairing.

Slightly Used & Demonstrating

Satisfaction Guaranteed

30x3\$4.50	32x4\$7.75	35x41/2\$ 9.25
30x3½ 5.50	33x4 8.50	36x4½ 9.50
31x3½ 5.75	34x4 8.50	37×4½ 10.00
32x3½ 6.00	35x4 8.75	35x5 10.25
34x3½ 6.50	36x4 8.75	36x5 10.25
31x4 7.00	34x4½ 9.00	37x5 10.75
A D D		m: 0 1 1

\$1 Deposit Required with Each Tire Ordered, Balance C.O.D., Subject to Examination.

ACCURATE TIRE CO.

Dept. A, 2119 Michigan Ave., Chicago, Ill.

OUR EXTRA QUALITY

Demonstrating

ALL NON-SKID TIRES ALL NON-SKID

	Will	Give	You	More	Mileage	
Size		Tire	Tube	Size	Tire	Tube
30x3	\$	6.00	\$1.75	33x41/4.	\$12.00	\$2.50
30x31/2.		7.50	1.90	34x41/4.	13.00	2.60
32x31/4.		8.50	2.00	35x41/4.	14.50	2.65
31x4		9.00	2.15	36x41/4.	14.50	2.75
32x4		10.00	2.15	35x5	15.50	2.85
33x4		11.00	2.25	37x5	16.00	2.95
34x4		11.00	2.35			
\$1.00	deposi	t requ	ired w	rith eac	h Tire ord	ered.
					o examina	
5%	off	for C	ash ir	Full	With Orde	er
WES	TER	NT	IRE	& RU	UBBER	CO.

Special Bargains in

Michigan Ave.

SLIGHTLY USED TIRES

The Kind That Will Satisfy All Customers

30x3\$4.50	32×4\$7.75	35x41/2\$ 9.25
30x3½ 5.50	33×4 8.50	36x4½ 9.50
31x3½ 5.75	34x4 8.50	37x4½ 10.00
32x3½ 6.00	35x4 8.75	35x5 10.25
34x3½ 7.00	36x4 8.75	36x5 10.25
31x4 7.00	34x4½ 9.00	37x5 10.75
Send \$1.00 de	posit with each	tire ordered.

Send \$1.00 deposit with each tire ordered. Balance C. O. D., subject to examination. Specify if Clincher, Q. D., or Straight Side.

American Tire & Vulcanizing Co.
Phone: Calumet 5170
2136 S. MICHIGAN AVE., CHICAGO, ILL.

Tire Service

Send casings and tubes for expert repair

Vulcanizing—Retreading

Doubling the life of your tires saves your money. All work guaranteed. Our truck will call for and deliver city orders. Work from outside may be sent by prepaid express.

Economize by doing business with

COMMERCIAL DEPT.

MICHIGAN STATE AUTO SCHOOL

691 Woodward Avenue

CYLINDER GRINDING

Manufacturing of oversize Pistons, and Wrist Pins, for all makes of Cars, Trucks and Tractors. All work guaranteed. Best workmanship.

Send for Our Price List

MILWAUKEE CYLINDER GRINDING CO. Humboldt & Concordia Ave., Milwaukee, Wis.

GUARANTEED.

Cylinder Regrinding

PISTONS—RINGS—PINS

When you send us your cylinders to be reground, and fitted with new pistons and rings, you know they will be returned to you correct to a third of a thousandth of an inch, because—

Our guarantee specifies that if, for any reason whatever you are not satisfied, you may return the new pistons and be refunded your money without quibble. Like the guarantee? That's our policy. Send your work.

NEUPERT MFG. CO.

82 Lark Street

Buffalo, N. Y.

Cylinder Grinding

NEW OVERSIZE PISTON RINGS AND PINS FOR TRUCKS, TRACTORS AND PASSENGER CARS.

Highest grade machinery equipment, no makeshift tools. Highest grade work fully guaranteed. Patterns for all pistons, 20,000 piston rings in stock.

Aluminite Pistons and Connecting Rods

put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon FOR TRUCKS AND TRACTORS, increase the power of the motor and save the bearings and cylinders.

Power Plus Cylinder Heads For Ford Cars

Keep the motor cool, especially efficient on Fords converted into trucks and tractors.

GUARANTEED MOTORS, complete stock new and rebuilt for cars, trucks and tractors. Parts for all motors and cars. Motors rebuilt. Our machinery equipment and factory space recently doubled insuring prompt delivery and perfect work.

SPECIAL ATTENTION GIVEN TO TRUCKS AND TRACTORS.

ASK OUR CUSTOMERS

Green Engineering Co.
Dayton, Ohio

Cylinders Reground

Over 800 Piston Patterns Always in Stock.

Our Expert Mechanics and our Highest Grade Equipment are your guarantee for highest class workmanship.

Our Special Light Alloy Pistons will give you More Power—More Speed. We also do Gear Cutting of Spur and Bevel Gears.

Write to Us Today

Auto Engine Works St. Paul, Minn.

CYLINDERS REGROUND

Oversize pistons, rings and hardened and ground piston pins. All cylinders ground on Heald grinders.

Send it to

COLUMBUS, OHIO

LITTER'S MOTOR MACHINE SHOP 240 North 4th Street

PISTONS, RINGS and PINS

For all makes of cars, trucks and tractors. Our improved reboring machine makes an absolute accurate job, at a minimum cost. LET US SHOW YOU

WHITCOMB TOOL & MACHINE CO.

SCORED CYLINDERS

REPAIRED BY "LAWRENCE PATENT PROCESS"

Work guaranteed for life of engine. 24-hour service. Tested and approved by all motor manufacturers. Fused electrically with silver-nickel alloy. No warping or enlarging of bore. Same piston and rings used.

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CLEVELAND ... 1810 Prospect
NEWARK, N. J ... 292 Halsey Street
DETROIT ... 1246 East Jefferson
SAN FRANCISCO ... 116 Hyde St.
PHILADELPHIA . 1601 Summer Ave.
LOS ANGELES ... 335 Washington St.
MILWAUKEE ... 18 to 24 Martin St.
MEMPHIS, TENN ... 247 Poplar St.

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Rebuilding and Repairing.

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QUALITY

SERVICE

Trindl Machine Works

Lue Total

PISTONS—PISTON RINGS—WRIST PINS CYLINDER GRINDING SCORED CYLINDERS REPAIRED CRANK SHAFT GRINDING 57-61 East 24th Street CHICAGO

Write for Our Illustrated Booklet

All Parts Duplicated

Cylinders Reground. General Machine Work for Foreign and American Cars. Welding of All Metals. Manufacturers of CATELAIN HOSE COUPLING. Ever-Ready Starters. U. S. Shock Eliminators. QUICK SERVICE; SATISFACTION GUARANTEED

ANDRE CATELAIN 1446-8 Indiana Ave.

Attention

CAR OWNERS

Winter driving demands strong engines. Why not give that trouble a knockout punch by having the

Cylinders Reground AND EQUIPPED WITH NEW PISTONS, PINS and RINGS by the

BUTLER MFG. CO. INDIANAPOLIS, IND.

YLINDERS REGROUND

Piston Rings and Wrist Pins Fitted. Ma-chine work of all descriptions.

DELCO IGNITION SPECIALISTS

WM. BENDER Chicago, III.

FOR PASSENGER CARS—TRUCKS—TRACTORS
We have the capacity and the skilled workmen.
Satisfaction guaranteed. "ONCE A CUSTOMER—
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MOTOR AGE

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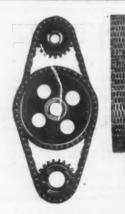
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Made a great showing during the war years 1916-1917 and 1918.

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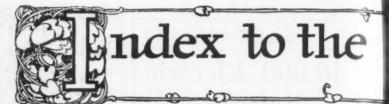
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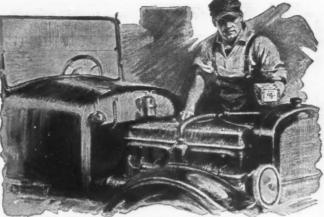




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R. & C. Organizing Company. Haker and Lockwood Manufacturing Company. Ballman-Whitten Company. Bearings Company of America. Bergie National Spark Plug Company. Bethiehem Motors Corporation. Billings and Spencer. Black and Decker Manufacturing Company. Bound Brook Oil-less Bearing Company. Brewer-Titchener Corporation. Brictson Manufacturing Company. Brown. J. W. Manufacturing Company. Brown-Lipe-Chapin Gear Company. Brunner Manufacturing Company. Brunner Manufacturing Company. Burd High Compression Ring Company.	128 75 133 132 65 136 81 135 104 133 130 132 136 83 130
Carlisle Cord Tire Company	109 136 134 58 56 129
Duntley, Jack Dyneto Electric Corporation	124 130
E. & W. Manufacturing Company Eastern Rubber Company. Eclipse Machine Company. Edwards Sales Company. Elsemann Magneto Company Elkhart Carriage and Motor Car Company Ellis-Smith Company Emeo Manufacturing Company. Essex Motors Company. Front company.	108 99 133 121 102 84 136 127
Fairbanks Company Fedders Manufacturing Company Federal Rubber Company Firestone Tire and Rubber Company France Manufacturing Company	136 4 91 136 134
General Utility Company Gibson Company Gillette Rubber Company. Gilmer, L. H., Company. Goodeli-Pratt Company Goodrich-Lenhart Manufacturing Company. Green Engineering Company. Gulf Refining Company. Guthard, Edgar C., Company.	92 62 136 115 95 120
Hall-Thompson Company Halladay, L. P., Company Hamilton Hotel Harvey Spring and Forging Company Hawthorne Company Hayes-Diefenderfer Company Higgins Spring and Axle Company Hill Insulating Company, Hill Pump Valve Company Hobart Bros. Holt Manufacturing Co	
Inland Machine Works	151
Jaxon Steel Products Company Jenkins Vulcan Spring Company Jersey City Machine Company Johnston, Charles H Jordan Motor Car Company Jorgensen Manufacturing Company 65a to	93 59 131 134 65h

Advertisements

Kellogg Manufacturing Company	36 34 31 63 32
Liberty Top and Tire Company	133 136 107
Mercer Automobile Company Metal Hose and Tubing Company Michelin Tire Company Mitchell Motors Company Moline Plow Company Moon Motor Car Company Moore Auto Company Motor Support Company Musso, F. G Mutty, L. J., Company Mutual Motor Truck Company	130 128 136 64 98 96b -71 134 133 122 86
National Wire Wheel Works. New Departure Manufacturing Company. New England Mills Company. New York Coil Company. New York and New Jersey Lubricant Company Nordyke and Marmon Company	133 3 150 126 130 72b
Oakland Motor Car Company	110 122
Pace Manufacturing Company Perkins-Campbell Company Philips-Brinton Manufacturing Company	132 113 87
	72 90 129 134
S. & P. Manufacturing Company. Schutte, Charles, Body Company. Scal-Tite Piston Ring Company. Scale Truck Sales Company Shaler, C. A., Company. Shaler, C. Company. Shaver, The, Company. Sheldon Axle and Spring Company. Spacke Machine Tool Company. Sparks-Withington Company. Standard Auto Manufacturing Company. Standard Auto Manufacturing Company. Standard Parts Company. Standard Steel Car Company. Standard Steel Car Company. Stewart Motor Corporation. Stewart-Warner Manufacturing Company. Storm Manufacturing Company. Storm Manufacturing Company.	118 133 135 132 94 127 89 136 117 118 126 133 105 84b 130 88 80 132
Tide Water Oil Company	8-69 74 120 55 82 128
Universal Products Company	136 131 134 132 136
Victor Truck Company	129
Walker Manufacturing Company Waltham Watch Company Watson Wagon Company. Walkesha Motor Company. Webber, Philip H., Company Webber, Philip H., Company Weston Electrical Instrument Company Wheeler-Scheller Carburetor Company Whitney Manufacturing Company Whitney Manufacturing Company Willys-Overland Company. Back company Wire Wheel Corporation of America Wisconsin Auto Top Company Wisconsin Motor Manufacturing Company.	136 134 2 119 135 130 150
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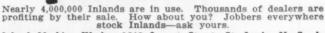
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To the Motorist:

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Some oils deposit more carbon than others, but the quantity deposited amounts not so much as that which sticks in the combustion chamber and to the spark plugs.

Paraffine in an oil has a tendency to form a sticky gum which collects the free carbon. The heat of the engine hardens the carbon thus collected, preventing its escape with the exhaust. Eliminate this sticky gum and less carbon is retained in the chamber.

Southern oils of asphalt base contain no paraffine—there is no sticky gum generated and the free carbon being a light, soft soot may be wiped off, and is more easily blown out with the exhaust—hence, a cleaner combustion chamber is the much desired result.

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Airplane Engines

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—TO THE OWNER of automotive apparatus with ZENITH EQUIPMENT it means con-

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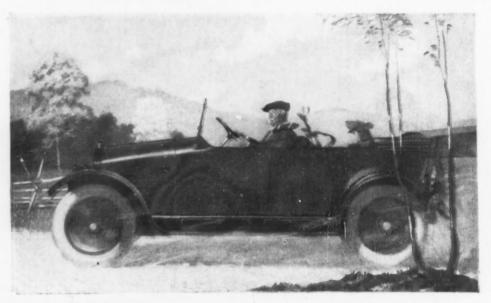
Write us about your carburetor problems. Our engineers will tell you what you need, where to get it, and how to get the maximum benefit from it.

Zenith Carburetor Company

Turin, Italy

Chicago





"600,000 Overland Owner-Salesmen"

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